Climate Plan 2018-2030

Ajuntament de Barcelona

A historic global agreement was reached at the 2015 United Nations Climate Change Conference in Paris, following extremely difficult negotiations: to take all necessary measures to prevent the global temperature from rising above 1.5 ºC. Since then, countries across the world, with the exception of the USA, have been working to set their individual emission-reduction targets and create associated action plans.

But we, the cities, cannot afford to wait and see whether their proposals are ambitious enough. The future of the fight against climate change is being played out in our streets and squares. We are where most of the population lives, the people most responsible for greenhouse gas emissions and the main focus of innovation. If we want things to change, we have to start by changing ourselves. And that will only be possible if we all take joint responsibility: citizens, companies, associations and authorities.

That is why Barcelona has decided to take another step along its path in the fight against climate change, which had already been bolstered in 2015 under the Climate Commitment, with the approval of a Climate Plan to prepare the city to meet the Paris agreement.

It is an ambitious plan that is intended to propel us towards a 45% reduction in greenhouse gas emissions by 2030 and turn us into a carbon-neutral city by 2050. A plan which, as you would expect, has been co-produced by hundreds of the city's organisations and under which we are boosting many of the measures that we had already started implementing and which prompts us to commit to embarking on many other initiatives.

The fight against climate change presents us with the challenge of bringing about a huge transformation of the city. This is a challenge that is worth fighting through, not just because it is an act of global justice but also because it will enable us to achieve a healthier, more pleasant and more sustainable city.

We can do everything if we do it together. It is high time we act against climate change.

Ada Colau Ballano
The Mayor of Barcelona

April 2018

CONTACT
contact@c40.org

SEE
C40.org
@c40cities
#Cities4Climate

Dear Mayor Colau,

Re: Confirmation of Paris Agreement Compatible Climate Action Plan

In 2016 nations of the world ratified a historic global agreement on climate change, the Paris Agreement, committing to keep global average temperatures within 2°C of pre-industrial levels, and to pursue efforts to limit temperature rise to 1.5°C. The Agreement also commits to strengthening the ability of countries to deal with the unavoidable impacts of climate change through adaptation. All of this is set within the context of sustainable development and on the basis of inclusivity for all communities.

C40's aim is that every C40 city will have developed and begun implementing a climate action plan before the end of 2020, which will deliver action consistent with the ambitions of the Paris Agreement, addressing both the need to reduce greenhouse gas emissions and adapt to the impacts of climate change.

With support from our cities, we have developed a Climate Action Planning Framework, which outlines the essential components of a climate action plan that is deemed to be compatible with the goals of the Paris Agreement.

It is with great pleasure that I can confirm we have reviewed Barcelona's Pla CLIMA against our Climate Action Planning Framework and found it to meet the requirements of the framework. Congratulations to you and your team on this achievement and for producing such a robust, integrated and ambitious climate action plan. Cities around the world will be inspired by your leadership.

We look forward to continuing to support Barcelona as you move towards implementing Pla CLIMA.

Your sincerely,

Mark Watts
Executive Director
C40 Cities Climate Leadership Group

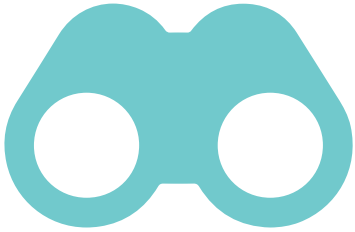
CLIMATE PLAN

BLOCK 1: CLIMATE

BLOCK 2: PLAN

BLOCk 1:

Climate Plan



CLIMATE PLAN

SUSTAINABILITY / INTERNATIONAL COMMITMENT
MITIGATION / ADAPTATION / ACTION / JUSTICE CLIMATE
/ FUTURE / VULNERABILITY / +HEAT -WATER -BEACHES
+FLOODS +URBAN HEAT ISLAND +FIRES
-BIODIVERSITY -AIR QUALITY / **HEALTH**
QUALITY OF LIFE / EMISSIONS
CONSUMPTION
POVERTY

1. A COMPREHENSIVE PLAN

Cities face a big challenge when it comes to tackling climate change because they generate 70% of greenhouse gas (GHG) emissions. Many of them are therefore adapting their agenda and adopting measures to reduce GHG emissions, minimise dependence on fossil fuels, improve efficiency, reduce metabolic flows and increase resilience. All of those measures are geared towards improving the quality of life and sustainability of cities.

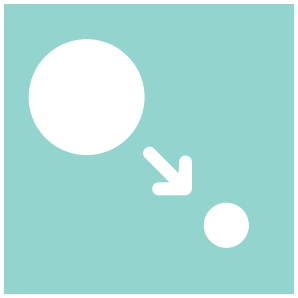
At COP21 in Paris, Barcelona presented the Barcelona's Commitment to the Climate (CBC), promoted by over a thousand businesses, citizen organisations and schools linked to the More Sustainable Barcelona network, signatories of the 2012-2022 Citizen Commitment to Sustainability and Barcelona City Council. This declaration **reaffirms previous municipal commitments** (Covenant of Mayors on Energy and Covenant of Mayors on Adaptation) and **defines Barcelona's roadmap for 2015-2017**, where city citizens and the City Council set out the priorities and the challenges to be overcome by their joint efforts.

The Barcelona's Commitment to the Climate goals and targets for 2030 are as follows:

- As regards mitigation, to reduce its levels of CO_2 equivalent emissions by 40% per capita compared to those for 2005.
- With regard to adaptation, to increase the urban green space by 1.6 km^2, in other words, 1 m^2 for each current resident.

The Barcelona Climate Plan includes existing actions and strategies along with new ones to achieve these goals, while **fulfilling the commitment it made when signing the Covenant of Mayors for Climate and Energy (2017)**.

The strategic lines the Climate Plan is based on are:



Mitigation, because we cannot allow a context of economic recovery to lull us into consuming in an unsustainable way again.

Adaptation and resilience, because we can already see the effects of climate change and we have to prepare ourselves.

Climate justice, because we need to put the most vulnerable people at the centre of climate policies.

Promoting citizen action, taking into account the Barcelona Climate Commitment while promoting co-creation projects.

Mitigation: all those actions geared towards reducing greenhouse gas emissions.

Adaptation and resilience: : all those actions geared towards reducing vulnerability to climate change.

Resilience: the capacity of cities to prevent or, where they are inevitable, minimise the impact of the natural and human-induced hazards they are exposed to, whether they are occasional episodes or tensions over a lengthy period, and to recover as soon as possible in order to continue their essential functions.

2. WHY DOES BARCELONA NEED A CLIMATE PLAN?

Key messages

Climate change is a reality and it is caused by humans. The fifth Intergovernmental Panel on Climate Change (IPCC) has demonstrated the unequivocal average rise in air and ocean temperatures, the changes in rainfall patterns, widespread thawing and rising sea levels across the globe. The need to step up our efforts in the fight against climate change has become even clearer in recent years, leading organisations and public administrations around the world to adopt various mitigation and adaptation commitments and measures, in order to reduce GHG emissions and vulnerability to the impact of climate change.

The cost of doing nothing is becoming ever greater. Not just in terms of social and environmental costs, but also economic ones. Taking action as soon as possible to deal with the present and future effects of climate change is an opportunity to create jobs, to innovate and improve our knowledge of the city, to reduce the risks associated with its vulnerability to climate change, and so on. The price the city would have to pay if it reacts late would be too high for everyone.

In that context, **the Climate Plan is an opportunity to join forces and make Barcelona a pioneering city that accepts responsibility for its contribution to climate change (reduces emissions), prepares itself to be less vulnerable to its effects (adapts) and becomes a fairer, more participatory city (promotes climate justice and citizen action).**

WE ARE RESPONSIBLE FOR IT

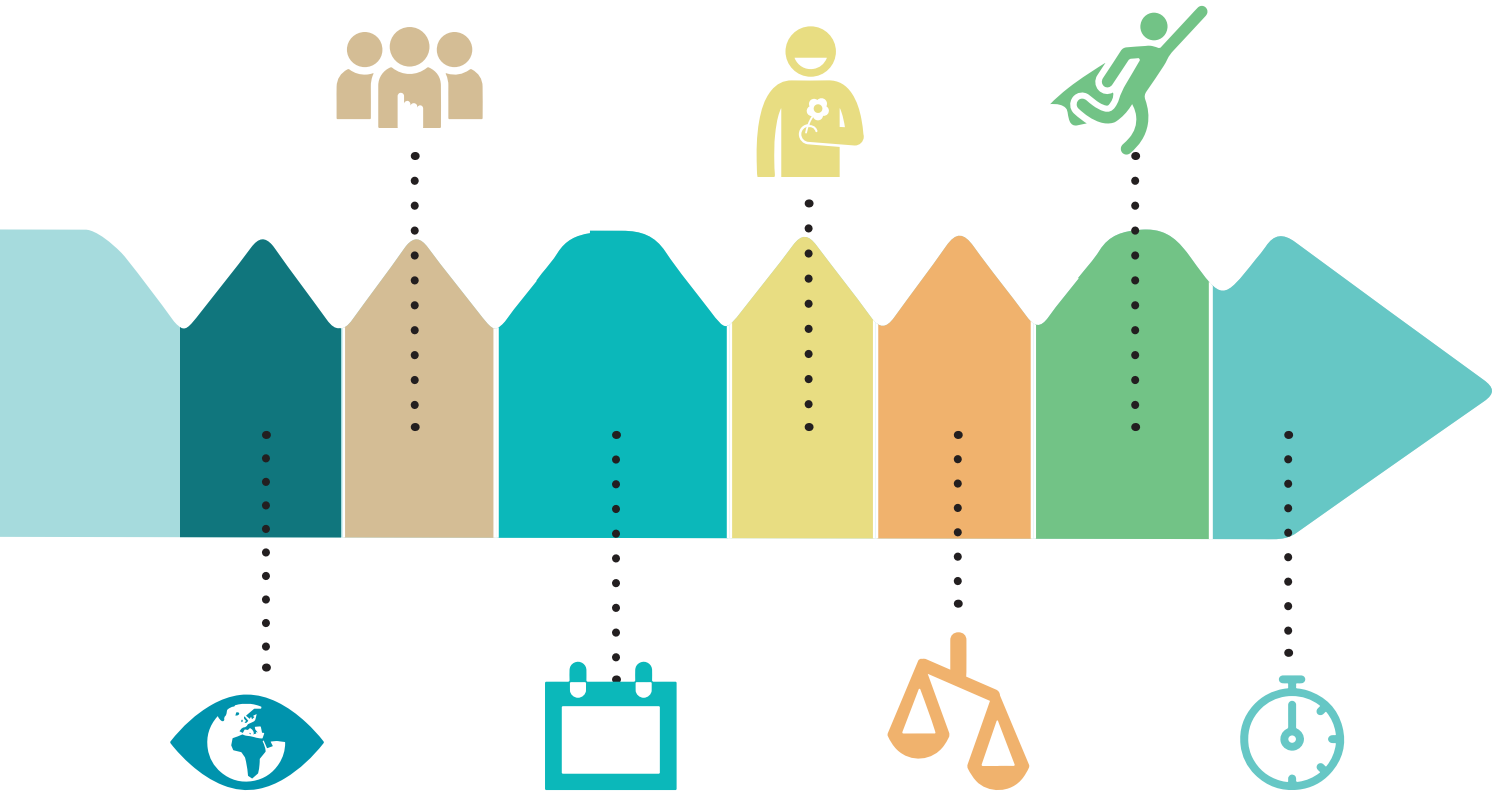
Human activity is the cause of this climate change. We are part of the problem, but also part of the solution.

IT AFFECTS PEOPLE'S HEALTH AND EVERYDAY LIVES

What is more, these changes seriously damage our health and affect our quality of life.

WE MUST ACT NOW

It is a priority, we cannot afford to wait. We must act with urgency, not caution.



CLIMATE CHANGE IS A REALITY

Numerous studies show it exists. There is no time for scepticism nor denial.

IT IS ALREADY HAPPENING

We are already noticing the effects: more heat, less water, more extreme climate phenomena, and so on.

CLIMATE CHANGE IS UNFAIR

It does not affect everyone in the same way, some people and neighbourhoods are more vulnerable.

THERE IS STILL TIME

We have the opportunity to act and the capacity to do so.

3. WE ARE NOT STARTING FROM SCRATCH

Barcelona City Council is firmly committed to implementing locally the climate and energy policies agreed on a European and international level. The Council has signed the following agreements:

Covenant of Mayors on Energy (2008)

Citizen Commitment to Sustainability (2012-2022)

"Making Cities Resilient" campaign and its "10 essentials" (2013)

Covenant of Mayors on Adaptation (2014)

Paris Declaration committing cities to the fight against climate change (2015)

Barcelona's Commitment to the Climate (2015)

Compact of Mayors (2015)

Covenant of Mayors for Climate and Energy (2017)

Global Covenant of Mayors for Climate & Energy (2017)

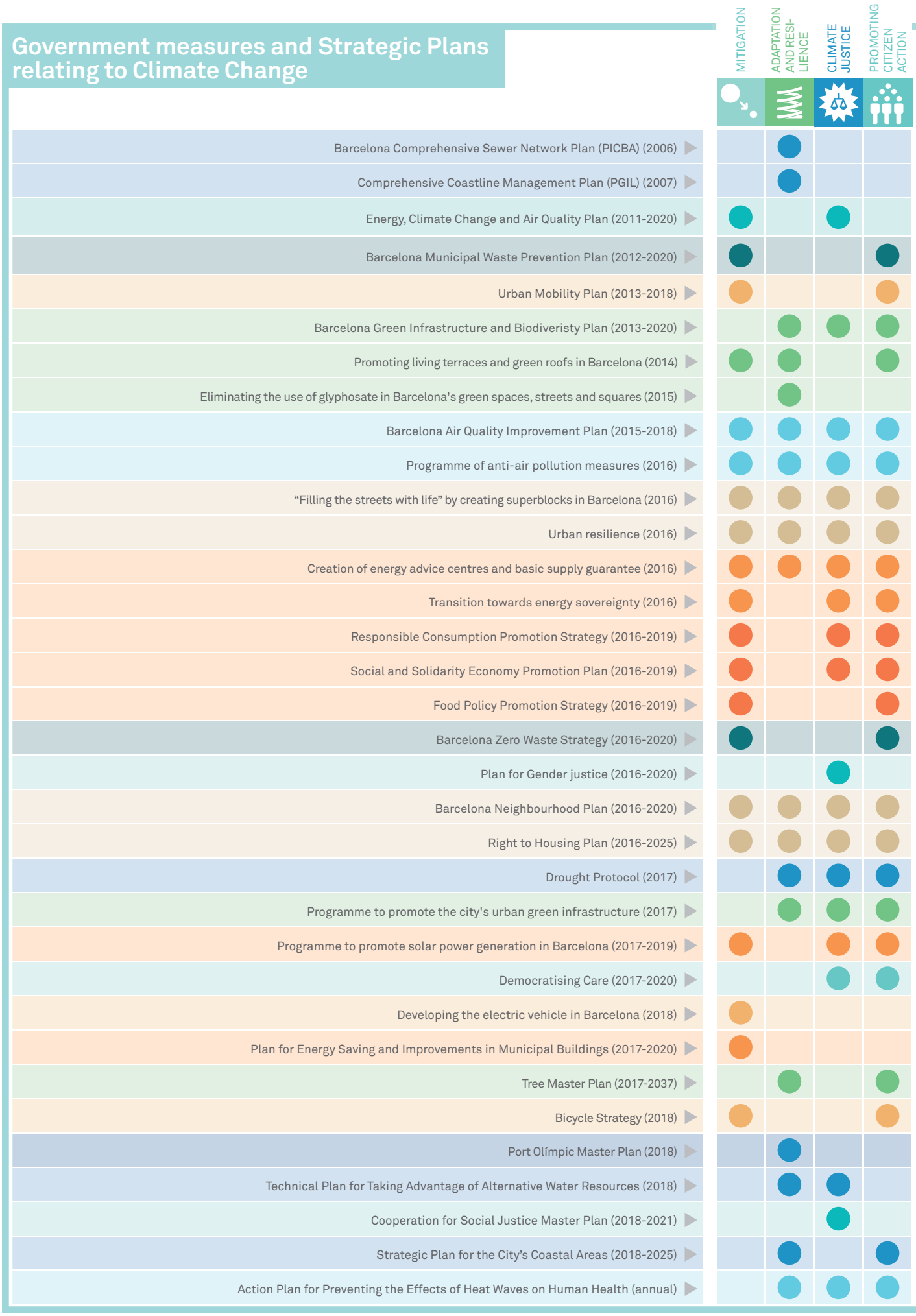
Barcelona has been working on climate issues for some years.

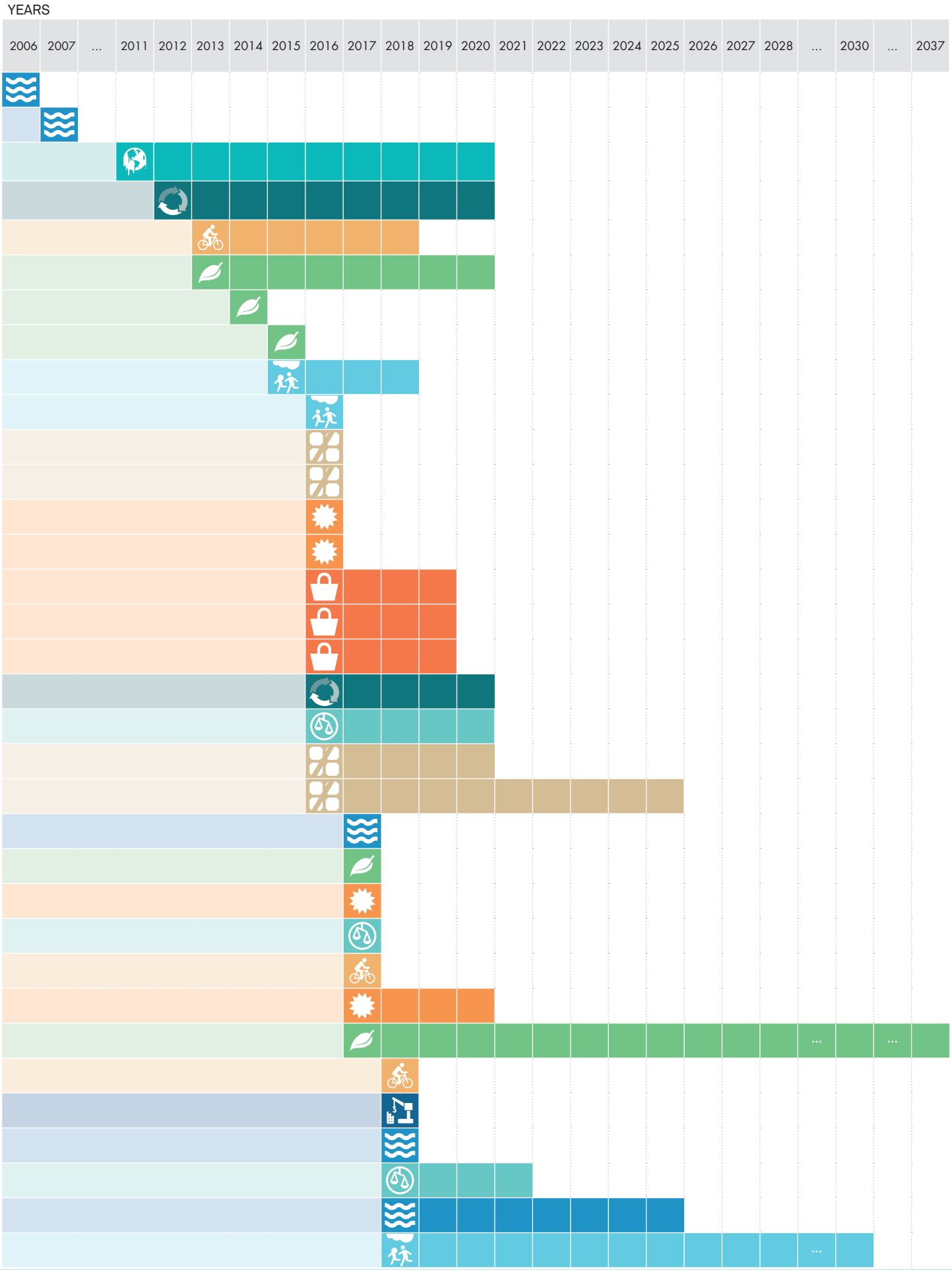
Primarily on measures directly related to mitigation, such as energy efficiency and energy saving, with the Thermal Solar Byelaw (1999), the Energy Improvement Plan (2002), the Photovoltaic Solar Byelaw (2011) and the 2011-2020 Barcelona Energy, Climate Change and Air Quality Plan and subsequently with the approval of other plans and strategies linked to adaptation. Adapting means implementing measures that reduce the city's vulnerability and increase its resilience to the undesirable effects of climate change.

So, as part of the policies for changing the model, to make the city a greener, fairer, more efficient and healthier place, various government measures and strategic plans have been drawn up over the last few years to achieve the climate goals. The Climate Plan recognises that these measures are already planned and therefore focuses on those that need to be developed further or on innovative measures that have not yet passed the planning stage.

The following image shows which strategic line (mitigation, adaptation, climate justice or promoting citizen action) that each plan, programme or government measure contributes to with specific measures.

Government measures and Strategic Plans relating to Climate Change




YEARS
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4 BARCELONA NOW

4.1. Barcelona in figures

City between water and mountain, standing between the Coastal Mountain Range, the Mediterranean Sea, the River Besòs and Montjuïc mountain.

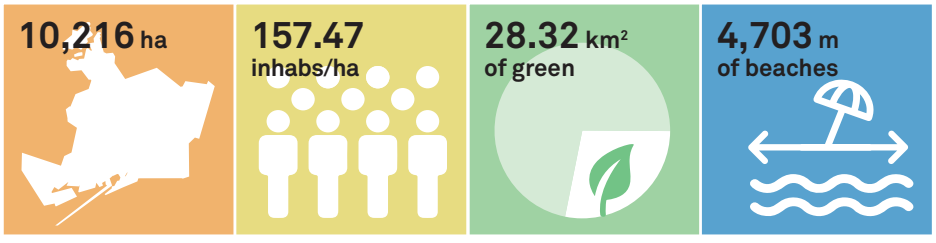
Compact city, one of the densest in Europe, with 1.6 million inhabitants in 101.3 km² and a metropolitan area of more than 3.2 million inhabitants.

Mediterranean city, for its mild climate and its location on the Mediterranean coast, with one of the biggest passenger ports in Europe and the world.

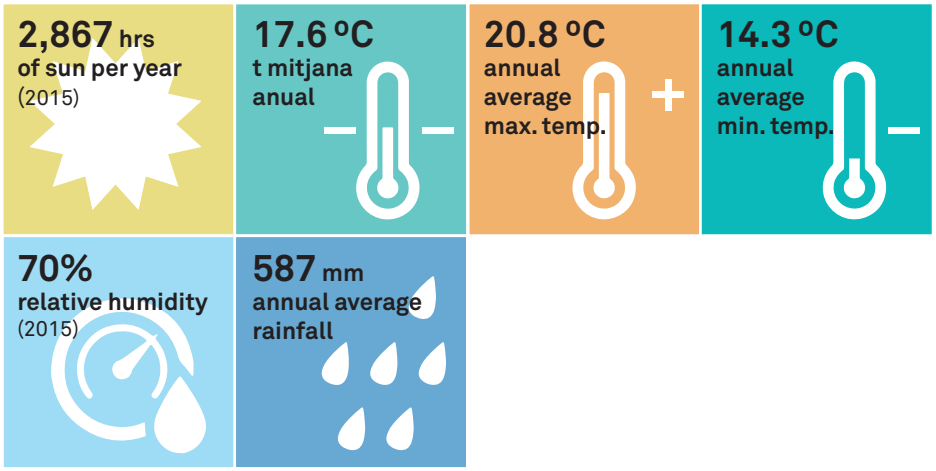
Service city, which in the course of a century has gone from an industrial to a tertiary base highly specialised in tourism, doubling its number of visitors in the last decade.

Economic city and centre, with an area of influence that spreads beyond the city itself and its metropolitan area to the rest of Catalonia.

Territory



Climate



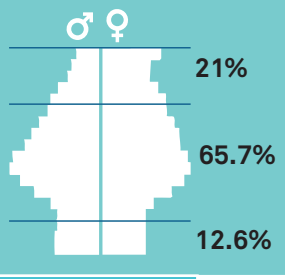
Population

1,608,746 inhabitants

83.9 Life Expectancy (2014)

Level of studies

Population pyramid



22.47% foreign population

9,065,650 tourists

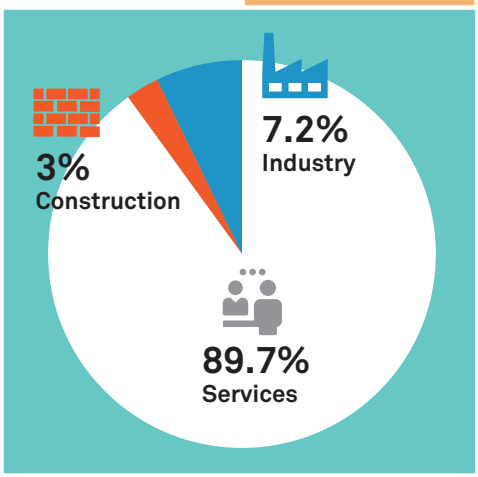
19,162,580 overnight stays

71.2% attended to by free, public health services

Socio-economic

€ 19,335 Disposable household income per capita (2015)

€ 77,605 million Total GDP (2015)



74.4% Employment rate

11.6% Unemployment rate

19.2% Risk of poverty rate (2015)

Environ-mental

9.75 MWh of energy consumed per inhab. (2014)

2.08 t CO_2-e emitted per inhab. (2014)

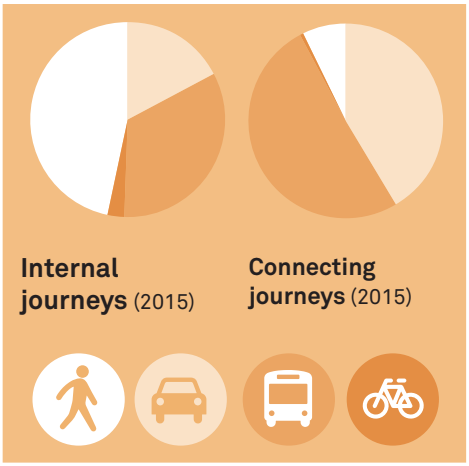
17.59 m² of green per inhab.

162.5 l of water/inhab. per day

107.5 l of water/inhab. per day in domestic sector (2014)

1.3 kg of waste per inhab. Day

8.04 million journeys per day



NO_2: 39 µg/m³

PM_{10}: 24 µg/m³

$PM_{2.5}$: 13.8 µg/m³

Annual averages

Source: Barcelona City Council data.
Where no date is given, the figures are for 2016.

4.2. Mitigation, a key area we need to keep working on

Emissions are still high

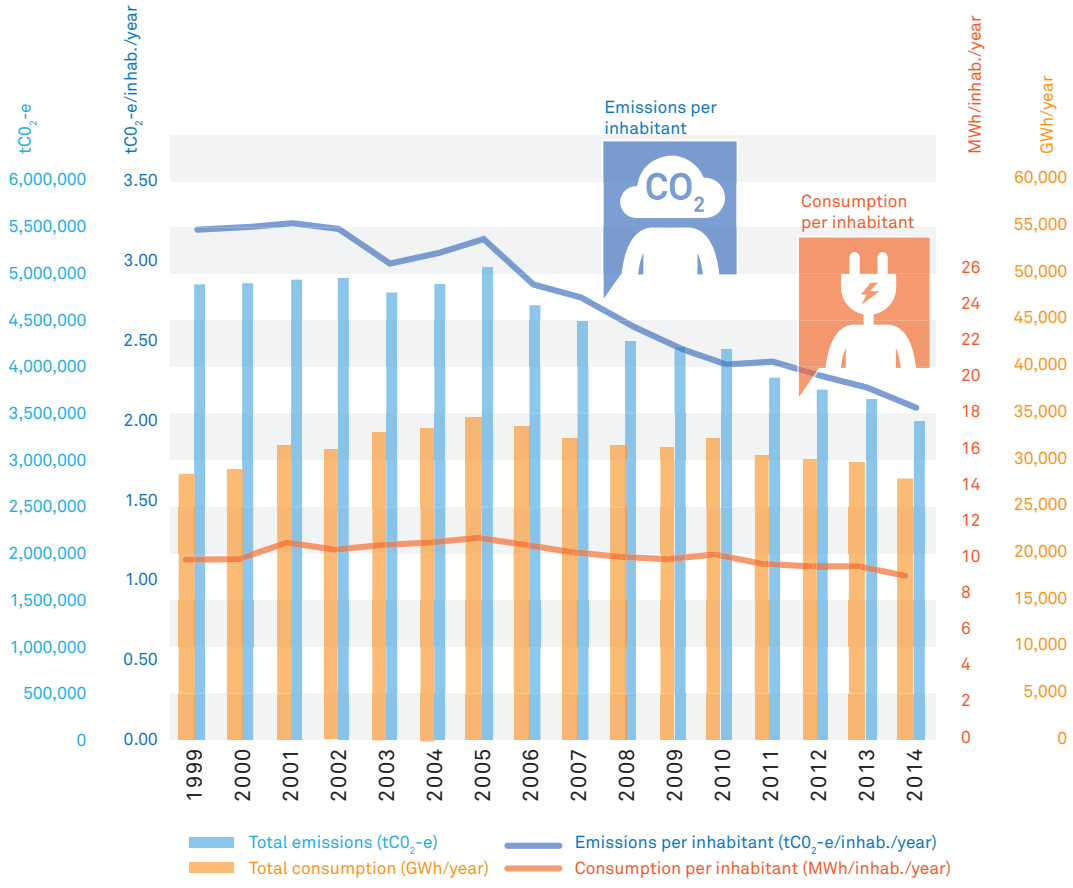
Total energy consumption and greenhouse gas (GHG) emissions in Barcelona have gone down in recent years, by 2% and 31% respectively between 1999 and 2014, and especially since 2005, when they peaked. The economic crisis and the rise in energy prices have contributed in a large measure to the implementation of energy-saving actions and good practices previously not considered. This shows there is a clear correlation between energy consumption and the socio-economic context.

Barcelona's energy intensity (which enables the increase in GDP to be measured against energy consumption) fell from 261.64 Wh/€ in 1999 to 215.51 Wh/€ in 2014. That means the city has been able to consume less energy per euro generated.

But what will happen when the economy picks up? According to the latest data available, energy consumption and emission generation both increased again in 2015 and 2016, with energy consumption and emissions in 2015 up to 15,865 GWh and 3,433,000 tonnes of GHGs respectively, and 15,633 GWh and 3,443,000 tonnes of GHGs in 2016, foreshadowing an upward trend in the coming years. There is therefore **a need to spread a new energy culture that uncouples economic growth from energy consumption**.

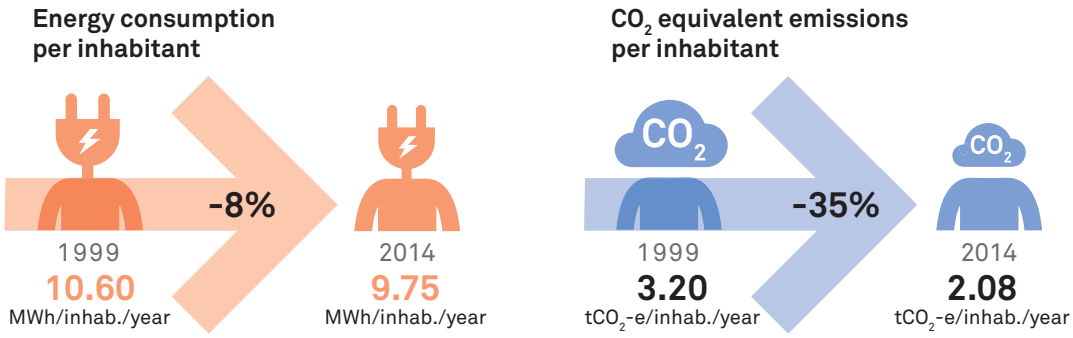
Energy consumption and GHG emission trends in Barcelona

Source: Barcelona Energy Report 2014. Barcelona Energy Agency (Barcelona City Council).



Energy consumption and GHG emission trends in Barcelona

Source: Barcelona Energy Report 2014. Barcelona Energy Agency (Barcelona City Council).



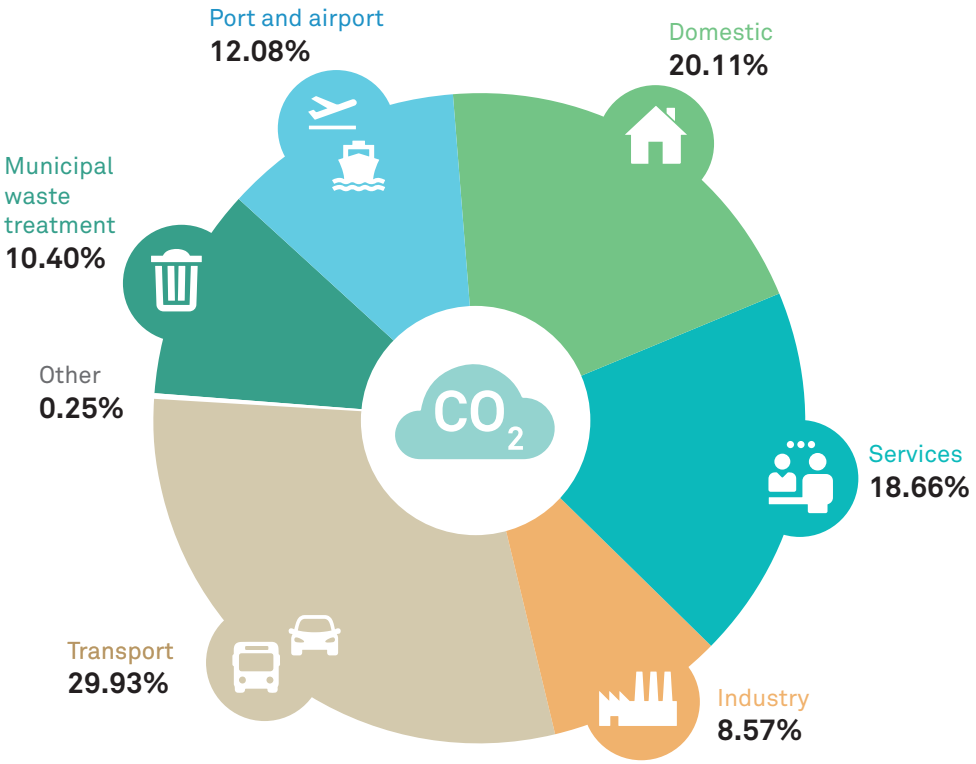
How does Barcelona consume energy and emit GHGs?

According to the figures for 2014, **the commercial and service sectors are the biggest energy consumers**, closely followed by the domestic sector and transport, with industry and the rest some way behind. **The order is different for GHG emissions, where transport is the big emitter**, contributing 30% of the total. The breakdown of emissions in 2015 and 2016 is similar to that of 2014.

However, since 1999, emissions in the various sectors have not followed the same trend. While they have increased in the commercial and service sectors (above all due to the increase in the share of tourism consumption and commercial activity linked to that), they have remained very stable in the domestic sector and transport, and fallen in industry.

CO_2-e emissions by sector

Source: Barcelona Energy Report, 2014. Barcelona Energy Agency (Barcelona City Council).



An energy mix with little renewable presence

Of the total primary energy consumption in the city in 2014, fossil fuels accounted for 47.24%, nuclear for a further 47.08% and renewables for just 5.68% (according to the Catalan mix) with similar sources in 2015 and 2016.

As regards the form, 41.6% of the energy Barcelona consumed in 2014 was electricity, 31.7% natural gas, 25.7% automotive fuel and 1% liquefied petroleum gas (LGP). The breakdown of consumption in 2015 and 2016 follows the same pattern, with a slight increase in LPG in 2015 and recovering the values in 2016.

With regard to the **source of electricity, 74.49% of what we consume comes from nuclear power** (which is why the Barcelona mix shows a low emission rate). **Renewable sources only account for 8.69% of the electricity Barcelona consumes**.

Primary energy sources according to the Catalan mix

Source: Barcelona Energy Report, 2014. Barcelona Energy Agency (Barcelona City Council).

FOSSIL FUELS (TOTAL)
47.24%

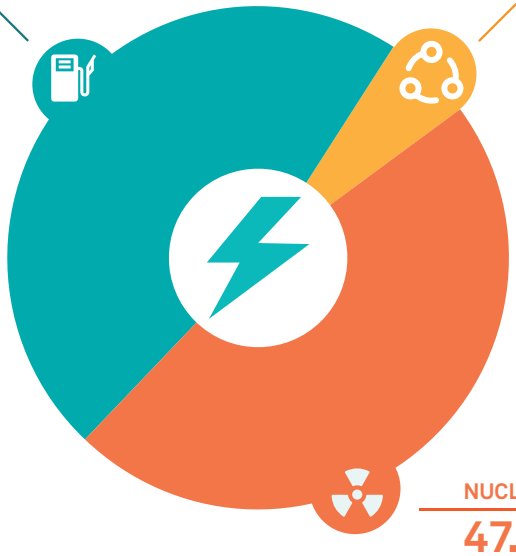
Gas combined cycle + direct distribution
27.93%

Liquid fuels
13.46%

Fuel/gas with cogeneration
4.83%

LPG
0.63%

Fuel/gas
0.39%



RENEWABLES (TOTAL)
5,68%

Hydropower and other renewables
3.69%

Wind
1.61%

Solar
0.27%

Municipal and industrial waste
0.11%

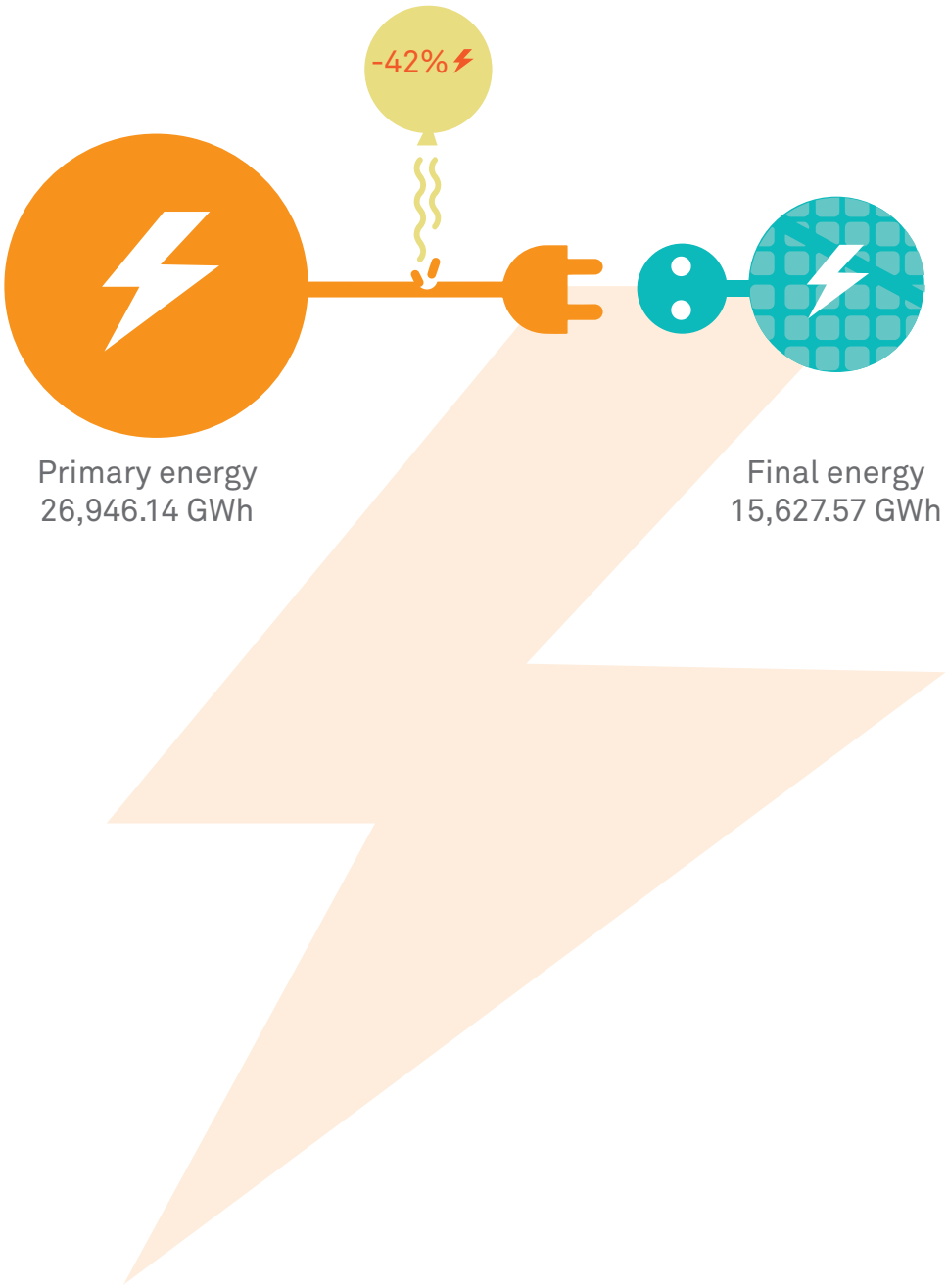
NUCLEAR
47.08%

Efficiency of the generation system and transport

A total of 26,946.14 GWh of primary energy were required to provide the 15,627.57 GWh of final energy that Barcelona consumed in 2014. That means only 58% of the primary energy was transformed into useful final energy. Or, to put it another way, **42% of the primary energy was lost in generation and transport**. The pattern was the same in 2015 and 2016. We need to increase the efficiency of these processes with more suitable technologies, an aspect that directly depends on the big power stations.

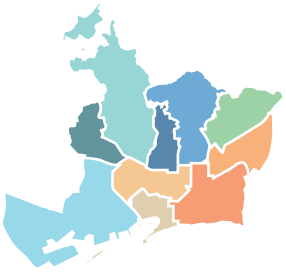
Efficiency of the power generation and transport system

Source: Barcelona Energy Report, 2014. Barcelona Energy Agency (Barcelona City Council).



4.3. Barcelona, a habitable city for the people most vulnerable to climate change too

One city, ten districts, ten realities



Wealth
Disposable household income (RFD) measures the income households can allocate to consumption and saving. The average annual RFD per capita in Barcelona is 20,800 euros (data from 2016), value equivalent to 100 with respect to the RFD index. The District with the highest RFD index is Sarrià - Sant Gervasi (182.4 euros), while Nou Barris has the lowest (55 euros). Taking the city as a whole, 16.7% of the population has an income in the top bands (more than 126% of Barcelona RFD), 47.9% in the middle bands (between 79% and 126% of Barcelona RFD) and 35.5% in the bottom bands (less than 79% of Barcelona RFD).

Access to water and energy
Nou Barris and Sant Andreu are the districts with the lowest RFD in the city, and these are precisely where people who use social services centres (CSS) suffer the most energy poverty (66.2% and 65.1%, respectively). CSS users in the districts with the highest RFD such as Sarrià - Sant Gervasi and Les Corts say they suffer less energy poverty (35.05% and 39.10% respectively). However, according to another source, the 2016 Barcelona Health Survey (ASPB, Barcelona Public Health Agency) Ciutat Vella is the district with the most energy poverty and Les Corts the least. So these two sources of information show there is a big difference in income in Barcelona, depending on the district, and that this has consequences for access to water and energy. It should also be pointed out that the income distribution trend in recent years has been one of growing income inequalities (a polarisation of the population in the very high and very low bands).

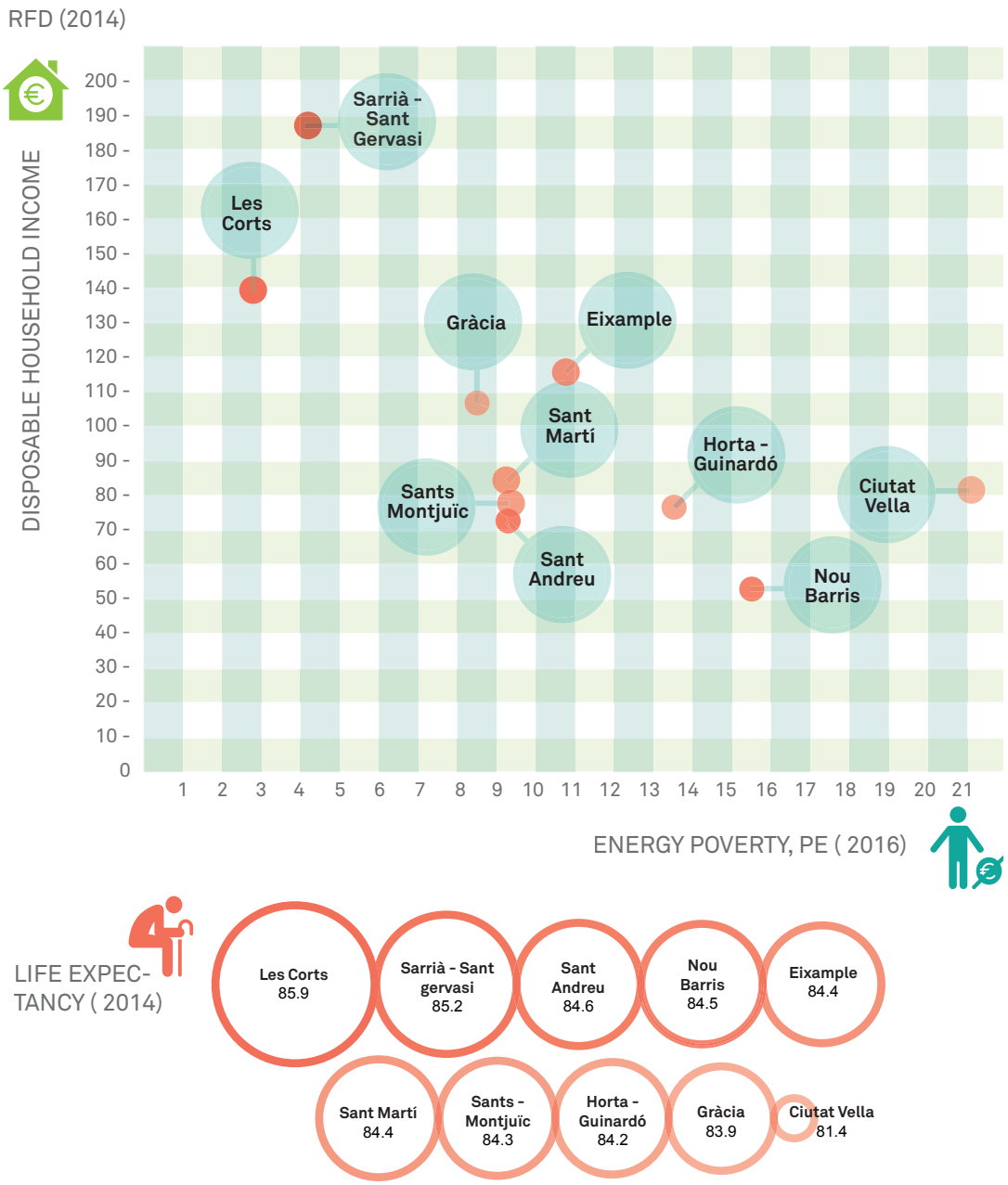
Life expectancy
The average life expectancy in Barcelona is 83.9 years, according to the figures for 2015. This index is directly related to economic, social and health levels. If we compare the districts, it can be seen there is a difference of 4.3 years between life expectancy in the district with the lowest figure (Ciutat Vella, 81.4 years) and the one with the highest (Les Corts, 85.7 years).

Health by neighbourhood
Clearly, health is not spread evenly around the city but unequally, depending on the neighbourhood. The Urban Health Equity Assessment and Response Tool (Urban HEART), (designed by the World Health Organisation (WHO) with a contribution from ASPB researchers), is useful to evaluate equity in health and response in urban areas and enables inequalities in health between people who live in different city neighbourhoods to be identified and analysed. Firstly, it shows that those neighbourhoods where the worst health results are concentrated are: 4 neighbourhoods in Ciutat Vella, 8 in Nou Barris, 3 in Sant Andreu and 1 in Sant Martí, Sants-Montjuïc and Horta-Guinardó. Meanwhile, the 15 where the best results are concentrated are in Eixample, Gràcia, Les Corts, Sarrià-Sant Gervasi and Sant Martí.

Age and training
No differences in energy poverty can be observed between age groups, except that it decreases slightly by band. If we analyse the situation according to the social class of the head of the household, 23.4% of unskilled workers (approximately 15,800 households) suffer from energy poverty, followed by the supervisory class in skilled technical jobs (13.9%) and the class in intermediate occupations (7.4%).

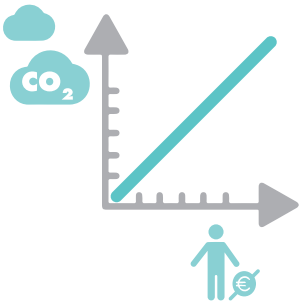
Disposable household income (RFD), energy poverty (PE) and life expectancy by neighbourhood

Source: Barcelona City Council.



Les Corts and Sarrià - Sant Gervasi are the two districts with the highest RFD in the city and the lowest energy poverty index. Both have the highest life expectancy in the city and, according to the Urban HEART, the best health. Nou Barris, on the other hand, is the district with the lowest RFD and highest energy poverty (after Ciutat Vella). Health levels are low in eight of its neighbourhoods, although life expectancy is one of the highest. Thus there is a certain inverse relationship between the level of wealth, life expectancy, health and energy poverty.

More climate change, more energy poverty



Climate change could cause water, energy and food prices to vary, and no doubt increase, and make access to these basic resources difficult.

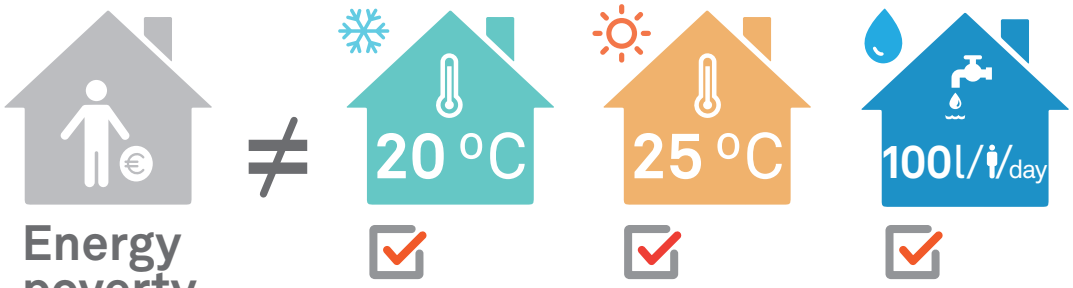
The main effects of climate change (more heat, less water) will also lead to changes in energy consumption patterns, with less demand for heating forecast while the demand for water and cooling could rise.

In addition, given the demographic and socio-economic dynamics in the city, the vulnerable population is expected to increase because there will be more households with dependent children and single-person households, migratory movements will grow and the ageing process will be more evident.

All these factors could mean an increase in energy poverty.

At present, energy poverty affects 10.6% of Barcelona's population (2016 Barcelona Health Survey), which represents some 69,500 households. This means that means 9.4% of the population cannot maintain their household at an adequate temperature during the cold months, while 14.5% say they are behind with utility and service payments (gas, water, electricity, community) and 9.2% say the have leaks and damp in their home. The percentages for the most disadvantaged social classes are 15.4%, 21.1% and 11.4% respectively.

Definition of energy poverty



Energy poverty

10.6% of Barcelona citizens suffer from energy poverty.

Font: Ajuntament de Barcelona.

Energy poverty: The inability of a household to satisfy the energy and water utilities to meet the basic needs of its members by:

- Keeping their home at the right temperature for their health (18 to 20ºC in winter and 25ºC in summer).
- Not having the minimum amount of potable water (100 litres per person per day).

Heat affects the most vulnerable population

In Catalonia, 19% more elderly people die when there is a heat wave. This figure can be as high as 27% in Barcelona, according to a study carried out by ISGlobal with data for the period between 1983 and 2006. The length of the heat wave is a more important factor than the intensity of the heat. And 1.6% of the people who die in the summer months do so because of the heat. Elderly people are the most sensitive group, so the older people are, the more mortality increases when heat rises. The increase is 15% for the 60-70 age bracket and 17% for those between 70 and 80, while there are 26% more deaths for those aged 80-90 in very hot weather. If they are over 90, the mortality rate is as high as 36%. But although elderly people suffer most in very hot weather, children under one are vulnerable too. The study shows that infant mortality for those under one year old also increases by 25% on extremely hot days, especially among babies just a few weeks old. We are only talking about very few cases, but in an analysis that covers a lot of years, the trend is significant.

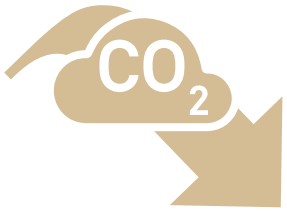
Climate change does not affect everyone in the same way. Each place has its particular social and cultural features, which are very often conditioned by their geographical and economic situation. In Barcelona's case, some neighbourhoods (due to their location, socio-economic situation or building quality) and some people (because of their age, status or health) are more vulnerable. From a climate justice perspective, the biggest challenges that climate change will pose are an increase in the vulnerable population threatened by energy poverty, health problems linked to heat waves and the possibility of food becoming more expensive.

People vulnerable to climate change: people who, due to their socio-economic situation, health or age, are directly affected by the effects of climate change.

5. BARCELONA IN THE FUTURE

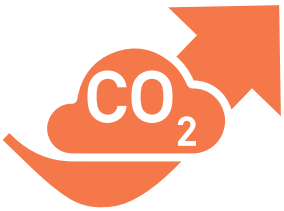
5.1. What will Barcelona's climate be like in the future?

Reducing emissions is a global commitment but the effects of not doing so are felt locally. Therefore, we have analysed how climate change might affect Barcelona on the basis of Catalan Meteorological Service projections, which represent a regionalisation of the problem, focusing on two possible scenarios:



1. COMMITTED SCENARIO (or RCP4.5)

A more **committed** scenario (aka RCP4.5), in which the 2015 Paris Agreement emission reduction targets are achieved. In this scenario, the concentration of GHGs would be higher than now at the end of the century but the increase would be reduced from 2030 onwards, in order to restrict the maximum rise in the overall temperature of the planet to 1.5 - 2ºC.

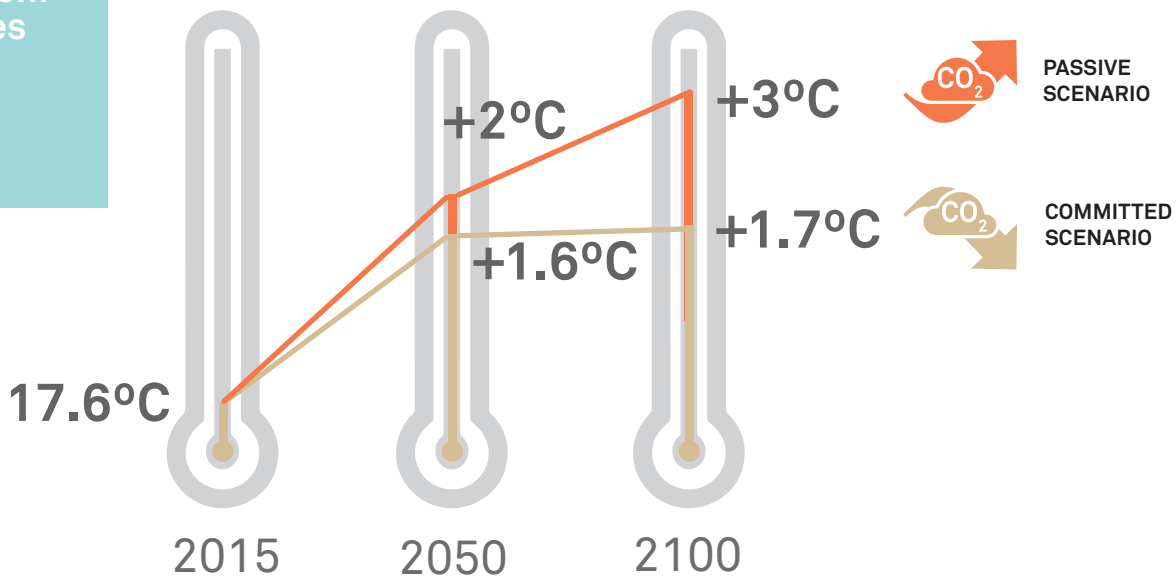


2. PASSIVE SCENARIO (or RCP8.5)

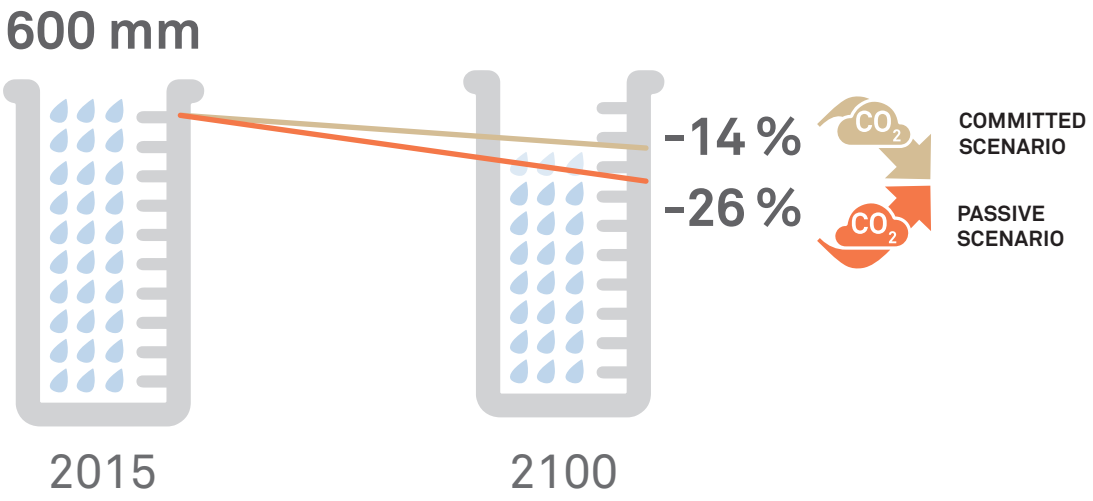
A more **passive** scenario (aka RCP8.5) which represents a situation in which the targets set in Paris are not reached, so the GHG concentrations at the end of the century would be much higher than present levels. The increase in global temperature would be considerably higher than 2ºC.

More specifically, a rise in temperatures is forecast in Barcelona's case, and a downward trend in rainfall.

Rise in temperatures



Fall in rainfall



5.2. The main effects of climate change on Barcelona

Climate change will affect Barcelona residents in the following ways:

People's health and survival:

- Heat has a direct effect on mortality, mainly on young children and elderly people.
- Climate change will be accompanied by new disease-bearing vectors, for example, tiger mosquitoes, which can transmit diseases produced by arboviruses, such as dengue, yellow fever, West Nile, chikungunya and Zika viruses.

People's quality of life and public safety:

- More discomfort due to the heat.
- Need to improve the comfort of homes.
- Need for more friendly public spaces (shade, fountains, cool places).
- Emergency situations caused by heat waves, flooding, drought or fires.

Guarantee of basic supplies:

- Scarcity of water due to droughts.
- High energy demand due to extreme temperatures.

Cost of living:

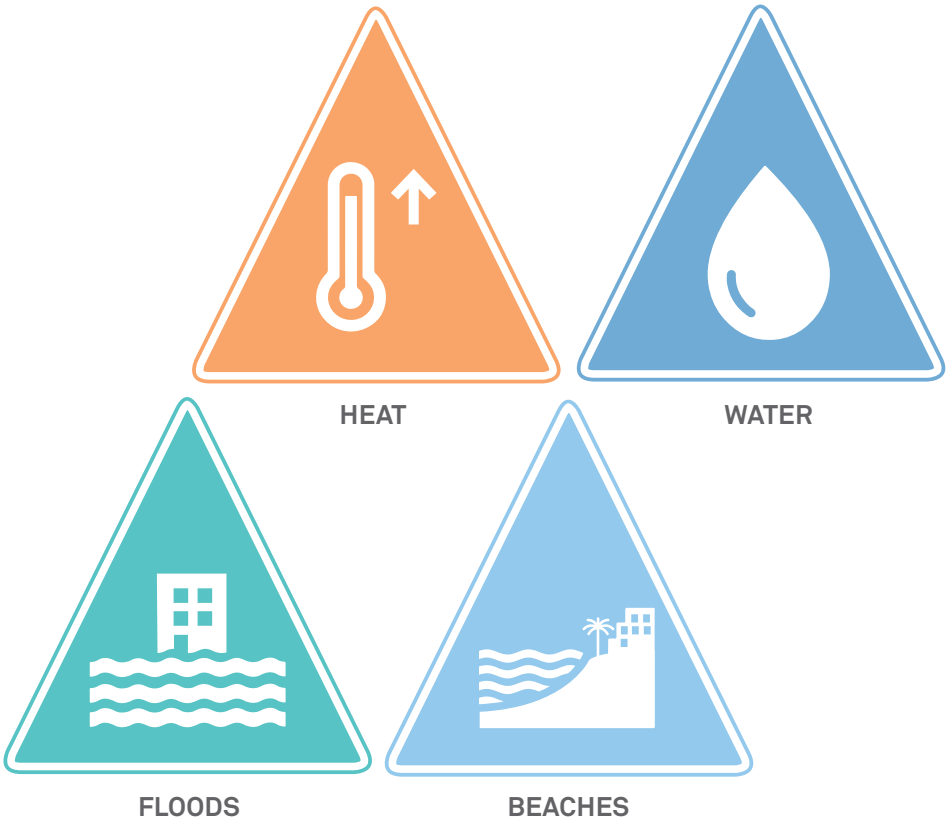
- Higher food and water prices.
- More poverty.

Environment:

- Disappearance of species and landscapes.
- Appearance of pests and infestations and invasive species.
- Loss of beaches.

The biggest climate change challenges that Barcelona will have to face are:

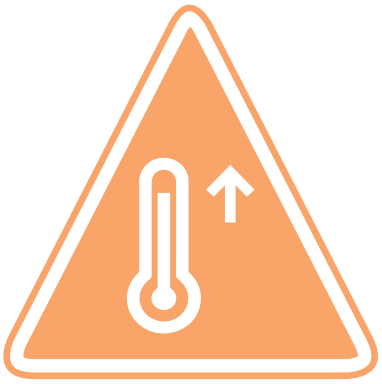
- Rising temperatures.
- Reduced availability of water.
- Increased flooding,
- Shrinking beaches.



We have also analysed the effect climate change will have on the following aspects:

If you want to consult the full studies, visit the Climate Plan website: http://lameva.barcelona.cat/barcelona-pel-clima

Increasingly hotter weather will have direct effects on health



In Barcelona, a heat wave is defined as a situation where maximum temperatures exceed 33.1ºC for three or more consecutive days.

Sustained, excessive heat leads to an increase in mortality and morbidity rates, especially among the more vulnerable groups such as the elderly, babies, people with physical or intellectual disabilities that have limited mobility or self-help, people with chronic illnesses, those who take medication that affects the central nervous system and those who live in socially precarious situations. The estimated number of deaths resulting from the 2003 heat wave was 411 (Borrell), although some studies put a higher figure: 537 (Tobias) and 665 (Martínez-Navarro, F).

Today

There have been eight heat waves in the city in the last 34 years and the most vulnerable areas are concentrated in neighbourhoods nearest the Besòs sector, part of Horta and a large part of the Sants-Montjuïc district.

Tomorrow

Rising temperatures will have consequences for health but not just in terms of heat waves. A rise in temperatures at night can also have an impact, as the period of night-time rest is when people recover from the heat during the day.

Measures implemented so far

Barcelona has been working for years to reduce the effects of heat waves in the city by, for example:

- Increasing the quantity and quality of green infrastructure, as this provides shade and cooler temperatures.
- Improving the thermal comfort of public buildings and facilities by means of energy renovation.
- Taking the necessary steps to ensure that people have equal access to energy, setting up the energy advice points (PAE) which offer information and support.
- Approving the Action Plan to Prevent the Effects of Heat Waves on Health (POCS).

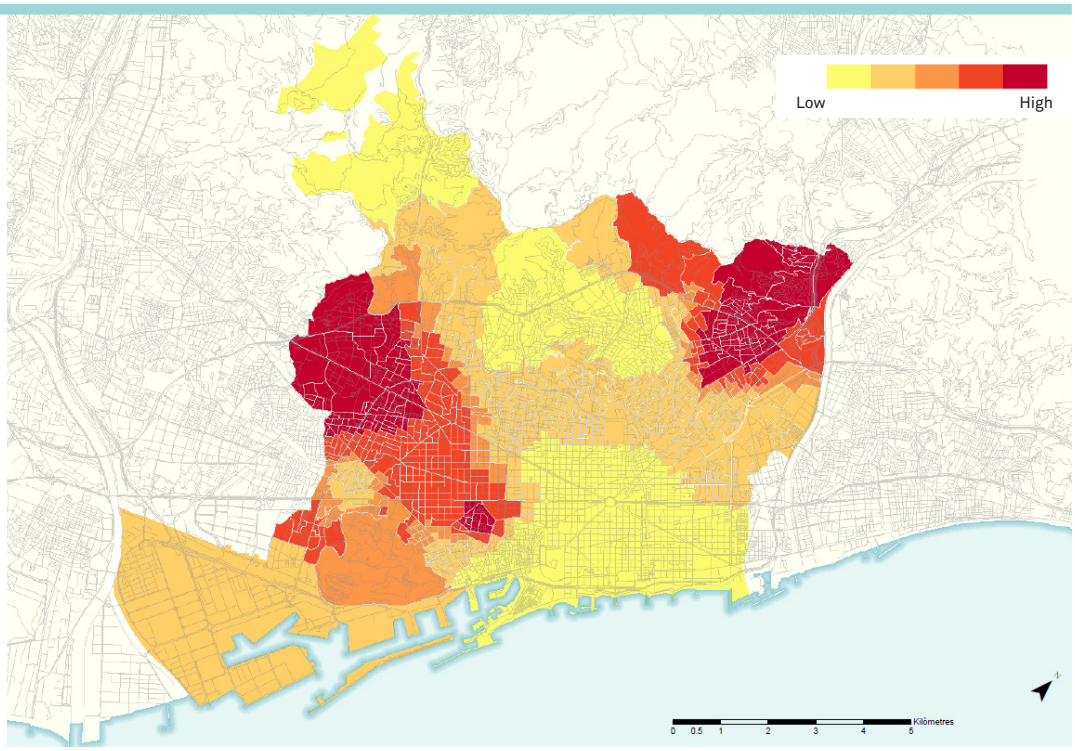
	Today (Current situation)	Tomorrow (End of century)	
		COMMITTED SCENARIO	PASSIVE SCENARIO
+33.1 °C Heat wave: when maximum temperatures exceed 33.1°C for three or more consecutive days.	1 heat wave every 4 years	2 heat waves a year x8	4-5 heat waves a year x16
> 30°C Hot day	22 hot days a year	50 hot days a year x2	80 hot days a year x4
> 35°C Torrid day	1 torrid day every 2 years	2.5 torrid days a year x5	8.5 torrid days a year x17
> 20°C Tropical night	38 tropical nights a year	83 tropical nights a year x2	112 tropical nights a year x3
> 25°C Torrid night	1 torrid night a year	2,5 torrid nights a year x2	6 torrid nights a year x6

Heat waves affects neighbourhoods differently, depending on their characteristics

In the analysis of the heat waves of 2012 and 2015, daytime temperatures were found to be highest in Les Corts, Eixample Esquerra, Nou Barris and Ciutat Vella. In contrast, the areas with the lowest temperatures were in the coastal area, specifically in Barceloneta and Poblenou, due to the thermoregulatory effect of the sea. However, at night the situation is reversed, with the highest temperatures recorded on the coast. The area showing the least variation in maximum and minimum temperatures is the city centre.

Temperature in the 2015 heat wave by Census Section

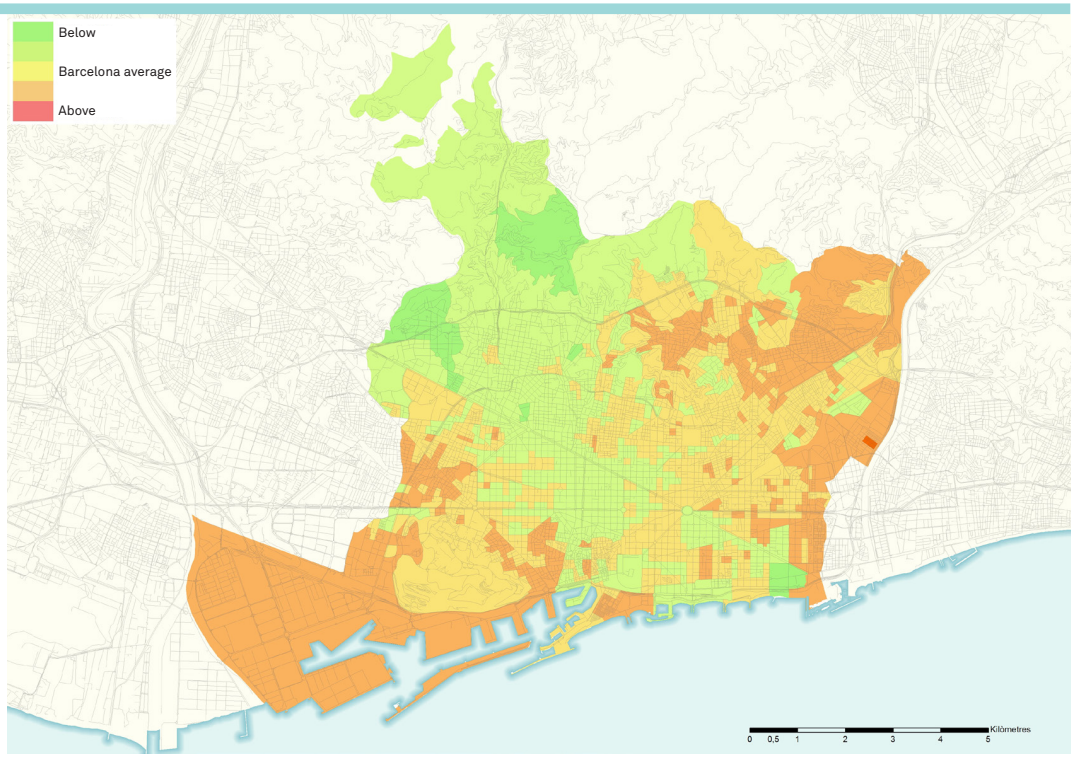
Source: Barcelona Regional, 2017.



A study has also been carried out on the city's vulnerability to high temperatures associated with risk parameters (population over 75; energy behaviour of buildings in relation to their air-conditioning demand; lack of vegetation and the socio-economic indicator of insufficient training). Taking these parameters into account, the most vulnerable areas are concentrated in the neighbourhoods near the Besós sector, part of Horta and most of the Sants-Montjuïc district.

Map showing Barcelona's overall vulnerability in heat waves

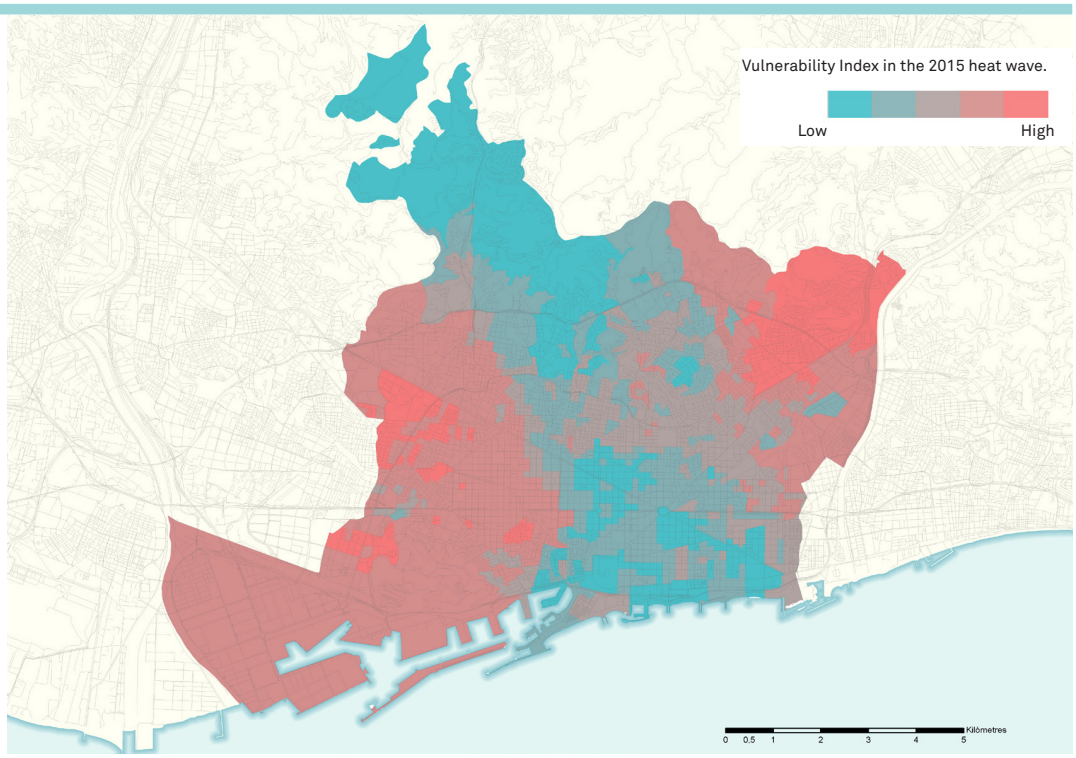
Source: Barcelona Regional, 2017.



Crosschecking the increase in temperature, which affects city neighbourhoods differently, with the vulnerability associated with the risk parameters, gives us a map showing the areas where the effects on the population are greater and action is therefore a bigger priority. According the map obtained, the city areas most affected by heat waves would be the Nou Barris district and some parts of Sants-Montjuïc, Les Corts and Eixample. Meanwhile, the areas where the effects would be less are those in the central strip, which includes the Sarrià – Sant Gervasi and Sant Martí districts and the right side of Eixample.

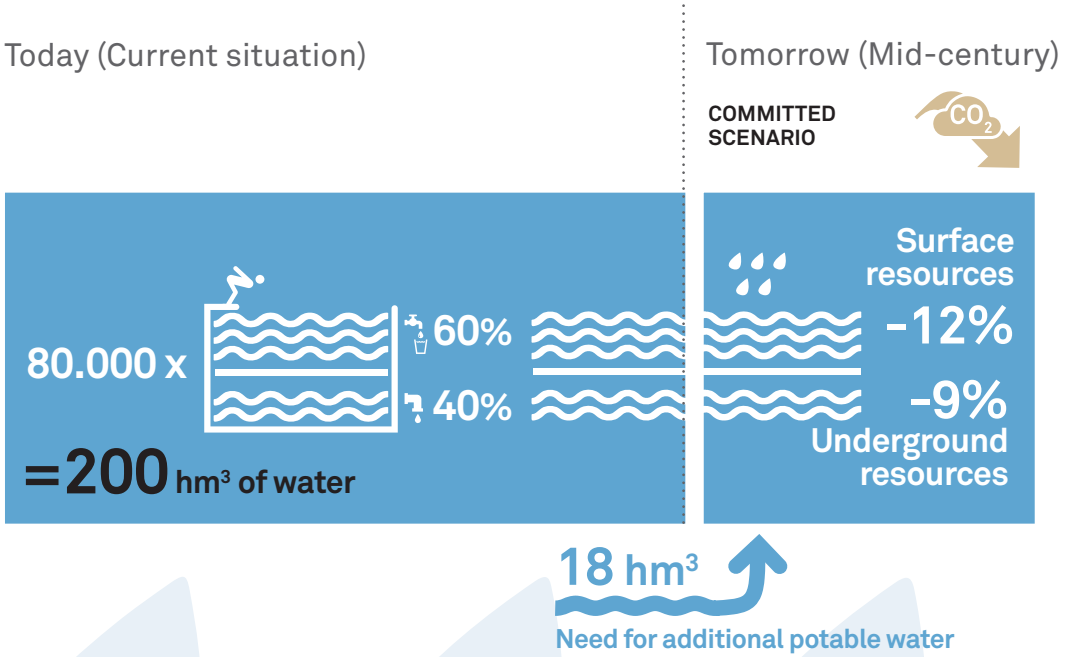
2015 heat wave risk map, from cross-checking the information on the heat suffered in the area in 2015 with the different factors analysed.

Source: Barcelona Regional, 2017.



Increasingly less water: Barcelona will need more water resources

Barcelona and its metropolitan area are home to most of the population and the majority of economic activities, which cannot cover their potable water needs with their own water resources. Consequently, a large part of the city's water supply currently comes from the surface resources of other basins. Other supply sources include underground resources, the desalination plant and rainwater.



Today

Some 200 hm^3 of water (80,000 Olympic swimming pools) enters Barcelona every year. 60% of that comes via the potable water system (117 hm^3), 30% from rainwater and 10% from groundwater for non-potable uses. However, the city currently has a deficit in its water supply system, as the resources are less than, or very close to, the level of demand one year out of every four. At the moment this is being resolved with the reservoir reserves of previous years, but the guaranteed supply is only one year.

Tomorrow

A slight reduction in water resources, greater variability in its availability and an increase in demand is forecast. More specifically, a 12% reduction in surface resources and a 9% reduction in underground resources is forecast by 2050, along with a 4% increase in demand for different uses. There will therefore be a general need for additional potable water resources in the metropolitan area of 34 hm^3 a year, with Barcelona's need estimated at 18 hm^3 a year.

In order to obtain the extra water needed it is planned to increase the use of alternative water resources, namely, 2.7 hm^3 of groundwater for all municipal uses that do not require potable water quality, 5 hm^3 of regenerated water for industrial uses and 1.3 hm^3 of grey water in new housing developments and renovation projects, besides exploiting the Besòs aquifer (12 hm^3) and using rainwater. There is also the desalination plant, which can provide water when necessary.

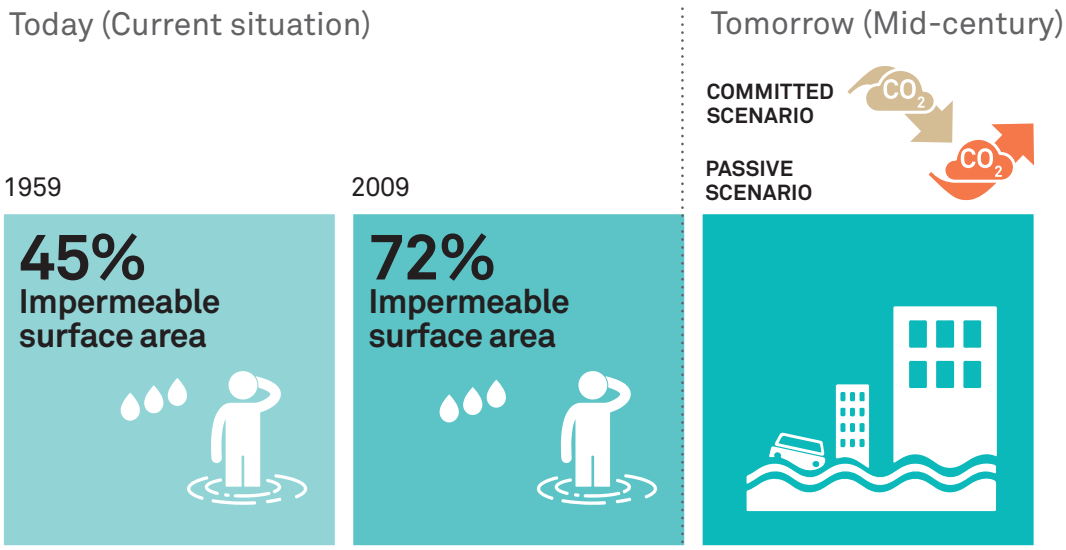
Measures implemented so far

The following measures have been implemented in recent years to reduce potable water consumption and guarantee the water supply:

- Campaigns and programmes to raise public awareness.
- Reduction of consumption in municipal services (public fountains, urban green infrastructure management, etc.)
- Use of alternative water resources, especially groundwater, for certain uses (sprinklers, cleaning, ornamental fountains).
- Consolidation and optimisation of the water supply system to prevent leaks.
- Improved system redundancy by linking up the main water tanks.
- Definition of a drought action protocol

Increased risk of floods

The risk of flooding due to a lack of drainage in Barcelona is shaped by the terrain profile, the high impermeability ratio and the artificialisation of natural water courses. This effect is increased by the characteristics of the Mediterranean climate where, typically, most rainfall is concentrated in few, high-intensity episodes.



Today

The high degree of impermeability in the city means a greater amount of rainwater is turned into runoff. From 1956 to 2009, Barcelona's impermeable surface area increased by over 2,800 ha, from 45% to 72% of the city's total surface area.

The drainage system can currently cope with rainfall that has a 10-year return period (T10), (despite the pressure on some sections).

Tomorrow

However, in the two scenarios studied and with the current level of impermeability, the system is expected to overflow at some points. Its fragility is evident in Poblenou, the Diagonal axis, Sant Andreu, Badal and Sant Antoni.

Measures implemented so far

Measures implemented in recent years to avoid flooding include the following::

- Construction of 15 rainwater retention tanks that protect the city against intense rain episodes, as well as the quality of the receiving environment.
- Promotion of sustainable urban drainage systems, which operate like natural processes for filtering, storing, infiltrating and evaporating runoff water in a decentralised manner that supplements the network of collectors and large tanks.
- Increasing the city's green surfaces.

Shrinking city beaches, due to the rise in sea level

Flooding caused by the rise in seal level is calculated by using the flood level. This is determined by three parameters: the localised increase in the average sea level causing permanent flooding; the tide and changes in wind pressure causing potential flooding; and, finally, the swell effect causing extreme flooding. Powerful waves are currently responsible for the major problems on the Barcelona shoreline during extreme storm episodes.

Today

Even in today's conditions, Barcelona's eight beaches are at high risk from sea storms. In fact. 80% of the their surface area, apart from Barceloneta, is affected by this risk.

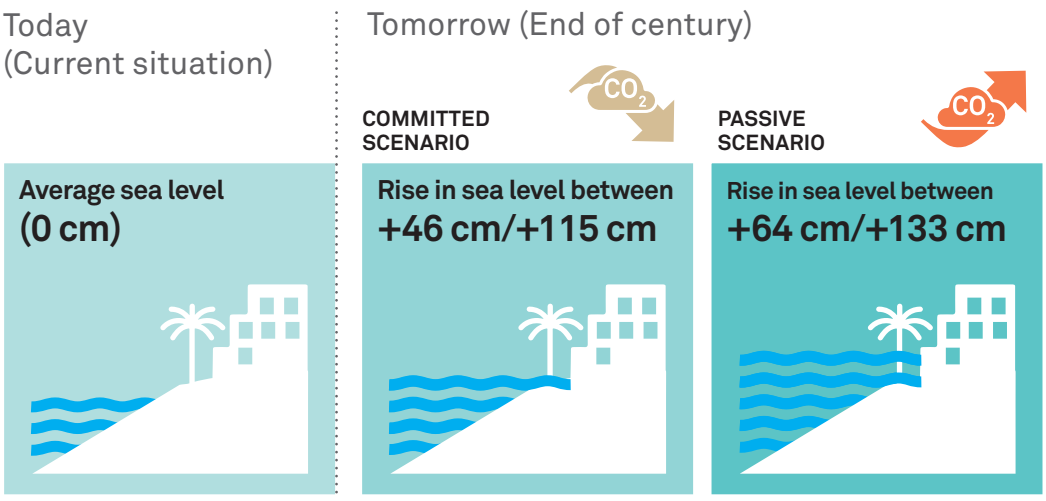
Tomorrow

As a consequence of climate change, it is expected that there will be more flooding, morphological changes in the beaches and a greater exposure of port infrastructures, although sea passage will not be affected at all under normal wave swell conditions.

A rise in sea levels could lead to the city's beaches shrinking, with a loss of the usable sand available to users on all beaches. Some, like Sant Sebastià, could almost disappear in the worst-case scenarios, while the others could suffer reductions of between 30% and 46%. General climate projections predict that extreme events will be more frequent but with little change in their magnitude. More specifically, in Barcelona, what before was associated with return periods of 50 years is forecast to be associated with periods of 35 years by 2050.

Measures implemented so far

In an effort to prevent the loss of sand due to the effect of sea storms and to protect the seafront, dykes have been built and over 700,000 m^3 of sand was brought in under the Barcelona Beach Stabilisation Plan in 2009 and 2010.



5.3. Other impacts that climate change has

AIR QUALITY

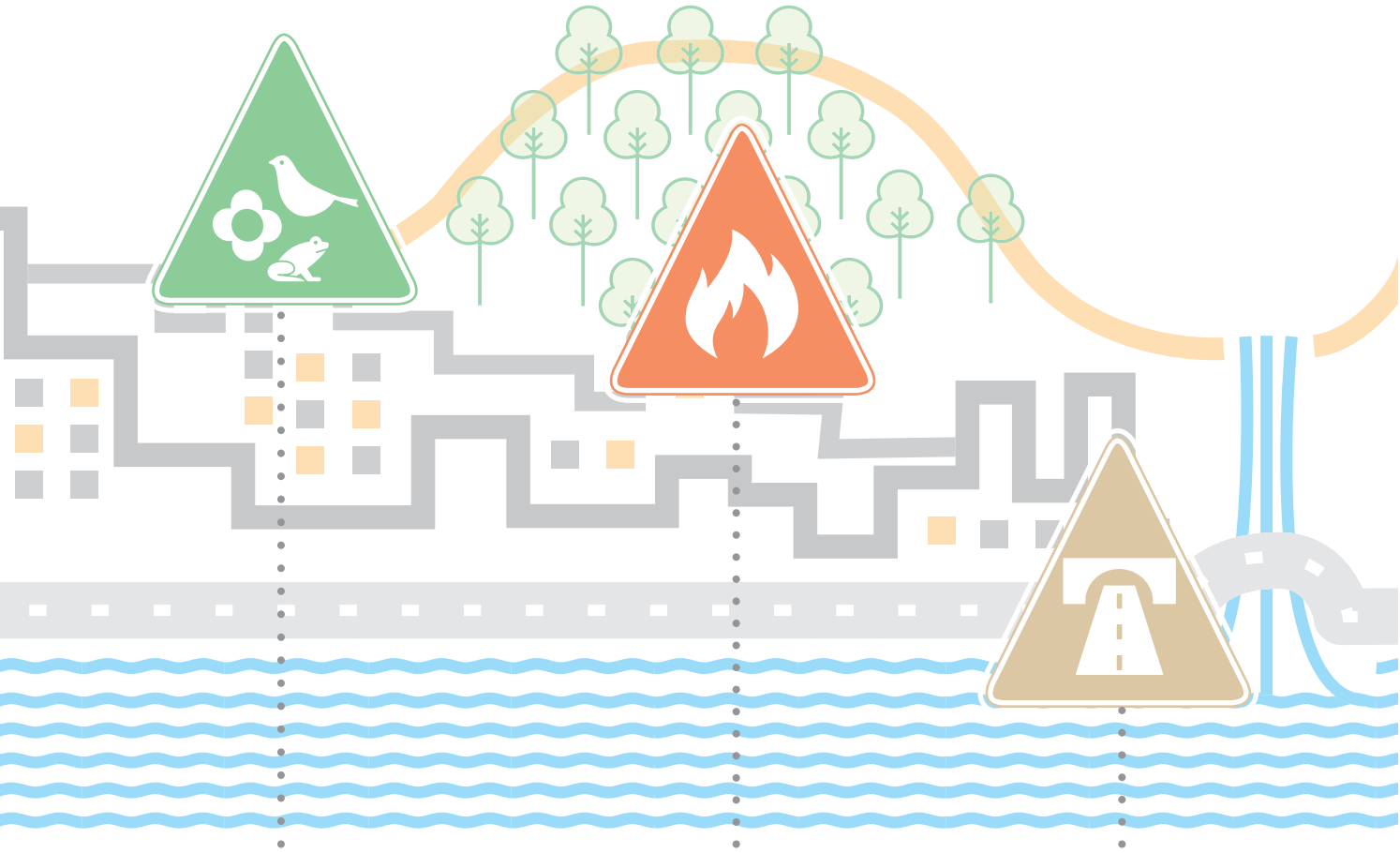
The projections made so far show the effects of climate change could lead to an increase in the annual concentration of the three pollutants analysed. The biggest increase would be in PM_{10} particles, medium in NO_2 and much less in O_3. However, those projections do not take into account that these increases could be offset by the consolidation of new technologies, which mean fewer emissions, nor the reduction in mobility by private transport.

URBAN HEAT ISLAND

The most intense urban heat island effect in Barcelona presently occurs at night and during winter. Urban monitoring stations register temperatures up to 3ºC (annual average) higher than those outside the city but differences of as much as 7 to 8ºC have been observed. Climate change will intensify the urban heat island effect, as it will increase exposure to episodes of high temperatures and heat waves, with more serious consequences.

ENERGY FLOWS

Taking into account consumption in all the sectors (residential, tertiary, transport and industrial), and bearing in mind that climate change will not produce any variation in the latter two, the projections show that in the "committed" scenario the reduction in energy consumption by the end of century will be 6.7% less than current consumption, and in the more "passive" scenario it could be 7.3% less than the current level. Despite the overall reduction in energy consumption, however, a change in the public's consumption patterns is forecast with an increase in the demand for electricity, mainly due to the need for air conditioning linked to episodes of high temperatures as well as new consumption linked to e-mobility, which would create a bigger need for power distribution infrastructure in the city.



BIODIVERSITY

Rising temperatures and periods of drought could impact on vegetation in natural areas. The phenology of plants is currently affected and water stress could mean a loss of vitality, the penetration of better-adapted species and make them more vulnerable to suffering from pests and infestations.

In the case of fauna, these changes could affect particularly vulnerable species: fish, amphibians and butterflies. It should be emphasised that some pest species (cockroaches, monk parakeets and murids) could benefit from the change in climatic conditions, as well as some species of mosquito that transmit diseases such as dengue fever, yellow fever, West Nile fever, chikungunya fever and the Zika virus. In general, all these changes could contribute to the simplification of ecosystems and therefore reduce biodiversity.

FOREST FIRES

Climate projections show there will be an increased fire risk in the Mediterranean region. Around Barcelona, however, there are other factors associated with human activity, urbanisation processes and changes in land use that bear the main responsibility for fires. Given the rise in temperatures and reduction in rainfall caused by climate change (leading to increased water stress and more highly combustible vegetation), there will be a moderate increase in the fire risk.

The areas of Barcelona where there is, and will be, a bigger risk of fires are mainly on the Barcelona side of Collserola in the Vallvidrera, Tibidabo i les Planes, Horta, Canyelles and Torre Baró neighbourhoods.

IMPACT ON INFRASTRUCTURES

After the beaches, the sanitation and transport systems are the infrastuctures that could be most affected by increased flooding risks(river, urban, due to a rise in the sea level or sea storms) or fires.

BLOCK 2:

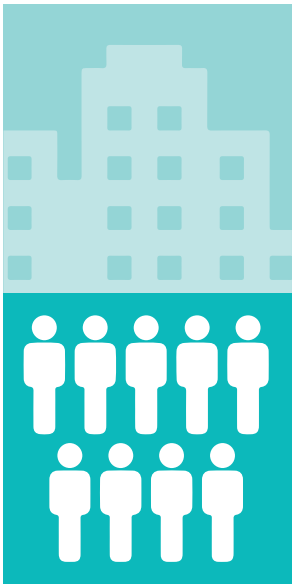
Climate Plan

CLIMATE PLAN

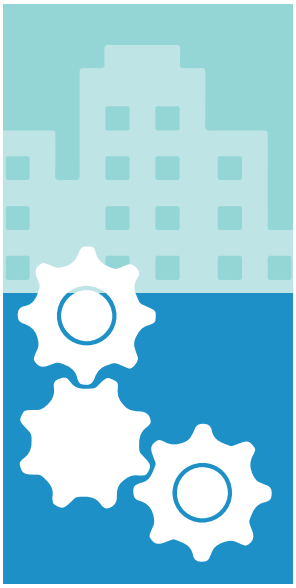
COMMITMENT / RESILIENCE / SAVINGS / EFFICIENCY
RENEWABLES / REFURBISHMENT / SUSTAINABLE
MOBILITY / **GOVERNANCE** / **TRAINING** / **INFORMATION**
COMMUNICATION / **COOPERATION** / RESPONSIBLE
CONSUMPTION / **CO-RESPONSIBILITY** / **ACCELERATION**
PROACTIVITY / GREEN AND BLUE INFRASTRUCTURE
CO-PRODUCTION / **LONG TERM** / **HOLISTIC** /**MULTILEVEL**
MULTISCALE / GREEN AND CIRCULAR ECONOMY
PRODUCTIVE ROOFS / HEALTH
CLIMATE SCENARIOS / **PROJECTIONS**

6. THE PRINCIPLES BEHIND THE PLAN

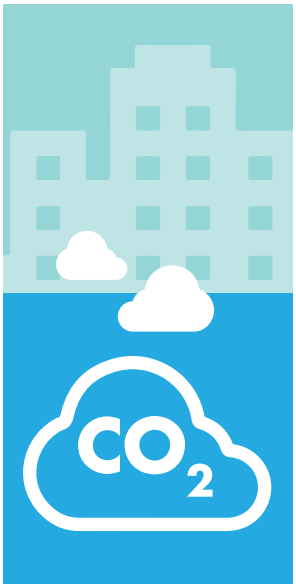
Barcelona is taking responsibility for its contribution to climate change and gearing itself up to be less vulnerable to its effects.



- By focusing on people, because it directly affects their health and quality of life.



- By comprehensively transforming the city so we can tackle the risks and turn them into opportunities.



- By speeding up efficiency, renovation and the introduction of renewable energies so we are better adapted.

- By approaching this through a process of co-production with city residents.

Mission

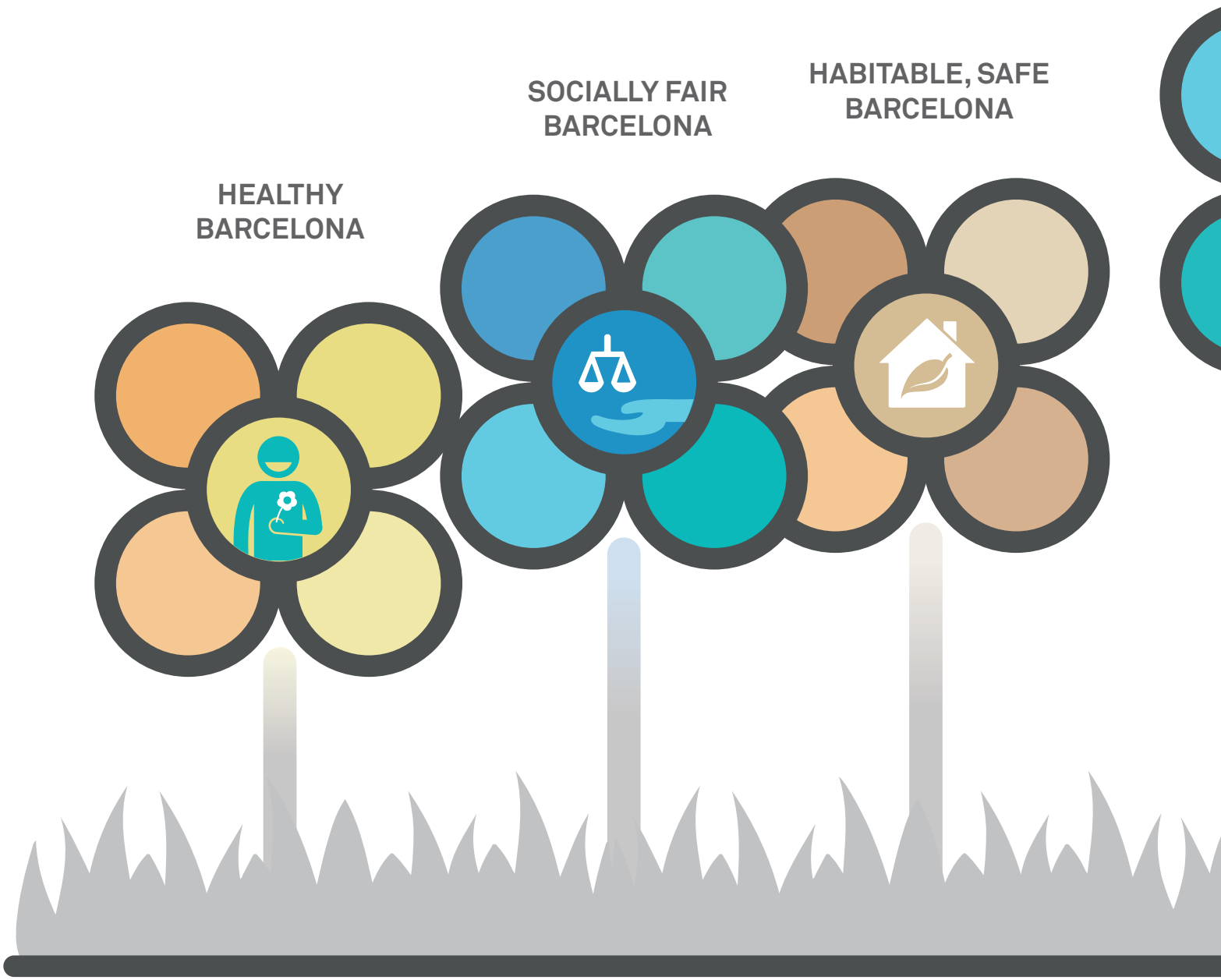
+ responsible
- vulnerable
+ health
+ quality of life

- To reduce Barcelona's contribution to climate change.
- To anticipate climate risks to ensure the city continues to function and improve its response capacity.
- To reduce the vulnerability of people to climate change by guaranteeing their health and well-being.

Vision

A proactive city that adopts a comprehensive approach to tackling the challenge of climate change and assumes its responsibility in that regard; a city that can find opportunities in difficulties and adapt to new climate conditions intelligently, generating co-benefits for people and socio-economic activity.

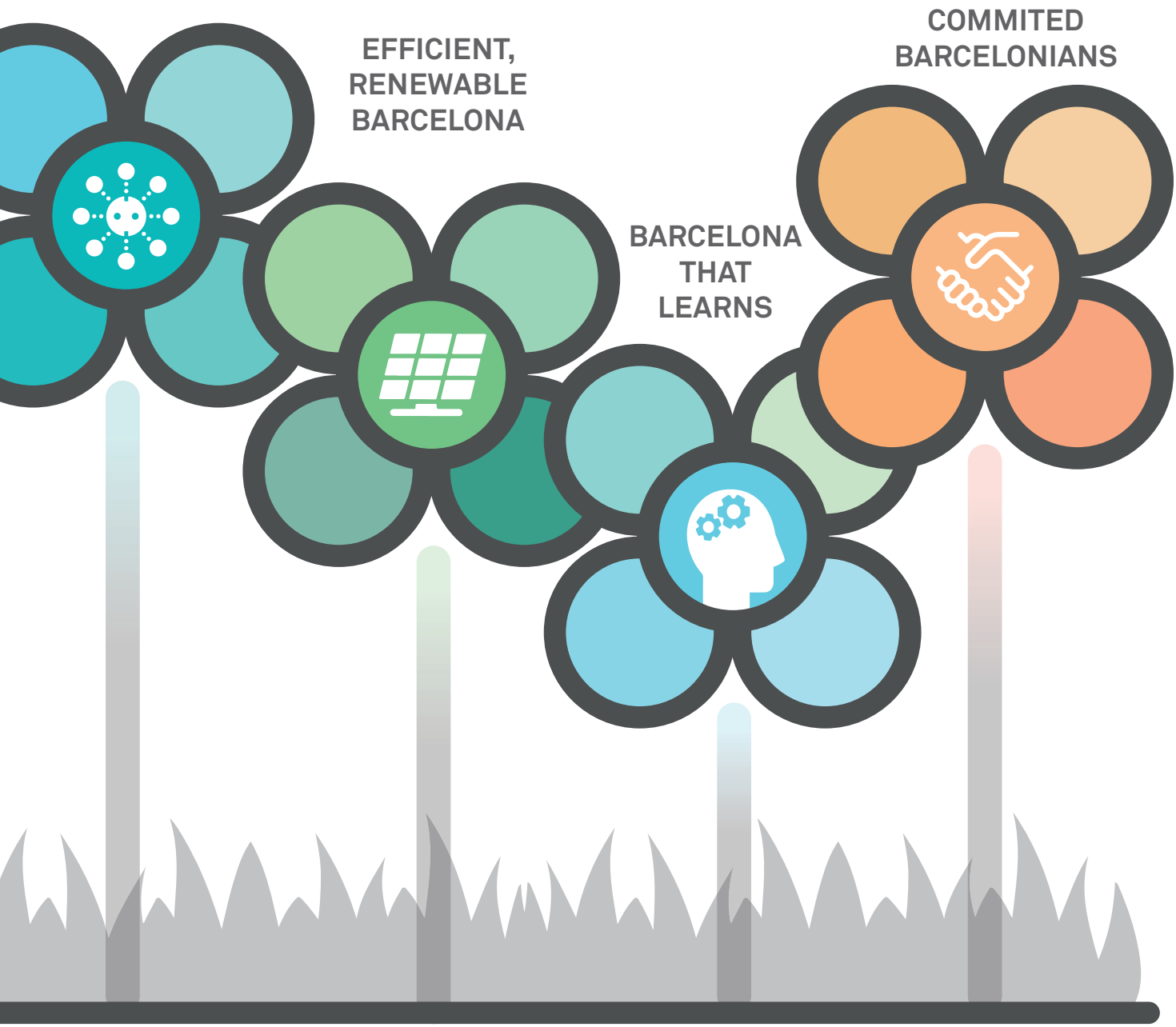
Values: the pillars of a more sustainable Barcelona



A **HEALTHY BARCELONA** that promotes active living, where you can breathe clean air and enjoy quality public spaces, and people's health and well-being is guaranteed.

A **SOCIALLY FAIR BARCELONA**, that takes the social, economic, gender, territorial and cultural diversity of its citizens into account when applying policies and measures.

A **SAFE, HABITABLE BARCELONA** that enables people to live in comfort and social cohesion, with quality green areas, and generates safe, friendly spaces that are suitable for everyone.



A **LOW-CARBON, DISTRIBUTIVE BARCELONA** that is not so dependent on fossil fuels for generating energy, nor products and services, and where economic benefits are distributed among its inhabitants.

An **EFFICIENT, RENEWABLE BARCELONA** with sustainable mobility, that makes good use of its resources and closes cycles.

A B**ARCELONA THAT LEARNS**, tries out solutions every day and never forgets, that moves forward and improves every day but is aware it still has a lot to learn.

And some **COMMITTED BARCELONIANS, MEN AND WOMEN** who know they can change the situation by their actions and protect the future for the generations to come.

All the measures in this Plan have a core theme in common: people and their well-being. Priority is therefore given to actions that correspond to the following criteria:

- They should provide a social return, that is, one with a positive cost-benefit relationship for society.
- They should be replicable and generate a high positive impact with a broad scope.
- They should be co-beneficial, in other words, respond to more than one challenge.
- They should be flexible and scalable as changes are gradually produced.
- They should prioritise green and soft measures (ones that use nature or governance) over grey measures (which imply big investments in infrastructures that are generally more rigid).
- They should be co-produced, with the maximum involvement of all interested stakeholders.
- They should enable us to take action, and learn from mistakes and good decisions, even without having all the information.
- They should not compromise the future, either in technological or contractual terms.

Scope

TIME SCOPE: LONG TERM

Climate change poses a challenge with a high degree of complexity and requires profound changes in the way of doing things. The climate projections are therefore made with 2100 in mind, while the goals and targets are long-term (2030 and 2050) and the associated actions either short-term (2020) or medium to long-term (2030), depending on their importance and feasibility.

TERRITORIAL SCOPE: MULTI-SCALE

Climate change does not respect borders. So, to analyse some specific issues (such as the water cycle), wider geographic scales are taken into account (metropolitan, regional, state and international). The Climate Plan envisages a range of measures, ranging from international cooperation to others on a neighbourhood scale.

COMPETENCE SCOPE MULTI-LEVEL AND HOLISTIC

Barcelona cannot fight climate change on its own. Naturally, it has to use all the powers it can, but it also has to be consistent with the policies and plans of higher authorities, especially in the metropolitan sphere. Therefore, the Climate Plan also has to involve organisations, companies and ordinary citizens in the process and promote co-responsibility. Finally, it has to do that with a holistic, intradisciplinary vision, where measures are projected and put into practice with a mainstream approach, integrating all sectors.

7. TAKING ACTION

7.1 The Barcelona's Commitment to the Climate as a forerunner

In 2015 a working group was set up among the network of signatories to the Citizen Commitment to Sustainability with the aim of defining the city roadmap on climate change and collaborative projects for 2015-2017. This gave rise to the **Barcelona's Commitment to the Climate (CBC).**

A total of 141 organisations were actively involved in drawing up the CBC. Four participatory sessions were held which culminated in its signing and presentation to the City Mayor on 23 November 2015.

The City Council and Barcelona citizens made a joint commitment, as well as a commitment to each other within their own respective spheres, to unify the initiatives necessary for achieving the CBC goals. The Council contributed five strategic measures and seven priority projects, while the citizen network defined nine projects to be rolled out in the course of the two years.

Specific teams were set up to define the citizen projects, receiving specialist training and advice on how to draw up a project and present it. They had a municipal helper for guidance, someone to ease the administrative tasks and a virtual "Wiki" platform was set up for contributions. The various teams met at least five times to give shape to their project and 135 people from 86 organisations took part.

Then, in accordance with the Covenant of Mayors for Climate and Energy (2017), the City Council initiated the drafting of the Climate Plan, which specifies the goals, targets, strategic lines and actions that need to be implemented between 2018 and 2030, with the target of being a totally carbon neutral city by 2050.

7.2 A Plan co-produced with our citizens

What are its objectives and methodology?

The general goal of the City Council-citizen co-production process has been to provide a space for the general public to express their opinions and make contributions to the Climate Plan. Thus, its operational goals are as follows:

- **Information:** Inform organisations and individual citizens about the Climate Plan and publicise it through the More Sustainable Barcelona network, as well as the general public.
- **Analysis:** Examine the City Council's Climate Plan analysis.
- **Proposals:** Gather proposals that can be included in the Climate Plan.
- **Return:** Explain to citizens how the proposals received have been taken into account.

Who has driven the process and where?

This process covers the whole city. The Citizen Sustainability Council has been the driving force, trying to involve all the city's citizens with an open process and with a particular focus on members of the More Sustainable Barcelona network in particular. A plan monitoring committee was also set up in the Council to ensure the participatory process ran smoothly and the planned schedule was adhered to.

Participatory meetings calendar

A co-production process was set in motion, running from July to December 2017, in order to gather the ideas of any individuals or organisations who wanted to contribute:

- The first session was held at the Espai Jove Fontana on 13 July. Here the Climate Plan was presented along with the co-production process that was just getting under way, and answers were given to seven key questions on the causes and effects of climate change in Barcelona. A participatory dynamic was then established in which various proposals were put forward.
- A second face-to-face session on action proposals took place on 17 October, with a debate and discussion that enriched the proposals for lines of action.
- A session open to the general public was also held on 14 September 2017 at the Urgell Civic Centre, where the Decidim platform gathered 27 proposals.
- The final session to present the Climate Plan took place on 27 February, 2018.

Tools available to the public

The Climate Plan has been included on the Decidim Barcelona platform. There is also a tool kit to help the various participants take the debate on climate change in Barcelona to their respective spheres and levels of work. It is a resources kit for organisations with guidelines and support materials for carrying out internal reflection processes within the organisations themselves over a period of two months, to enable them to contribute to the Climate Plan. The kit includes:

- Instructions for organising an independent session.
- Independent session agenda.
- Video: *Barcelona fa front al canvi climàtic. (Barcelona tackles climate change)*
- Video: *La veu dels tècnics del Pla Clima. (The voice of Climate Plan experts)*
- Seven questions and seven answers document on climate change in Barcelona.
- Information on the Barcelona City Council actions under way to tackle climate change.
- File with individual proposals.
- File with proposals from the independent session (group file).
- Access to the Decidim Barcelona platform

Participatory mechanism	Participants (representatives of organisations)	Number of Decidim platform contributions
Initial session (13 July, 2017)	58	-
"Fes-te sentir pel clima" (14 September 2017)	8	27
Discussion session (17 October 2017)	34	39
Proposals submitted directly to the Decidim platform	19	46
TOTAL	119 (92 people)	112 (85% accepted)

7.3. Climate Plan governance tools

Climate change is a global challenge that requires local actions. Moreover, it is a phenomenon that involves many environmental vectors (water, energy, biodiversity, waste, etc.) and has social and economic repercussions. Consequently, it cannot be tackled in isolation by a specific local authority department. It requires a cross-departmental approach that takes the complexity of climate change into account. The whole administration has to be involved in this global challenge.

On a municipal level a team has been set up as part of the Public Space Co-responsibility Board to deal with climate change. All municipal areas are represented and its aims are to:

- Assess and monitor climate change projects and policies (mitigation and adaptation) in the city.
- Develop and drive actions and projects for mitigating and adapting to climate change (drive existing mainstream projects in their own sphere and put forward new ones).
- Disseminate and make known, both internally and publicly, the projects that are being worked on in this area.
- Increase the level of information that municipal workers have on this issue.

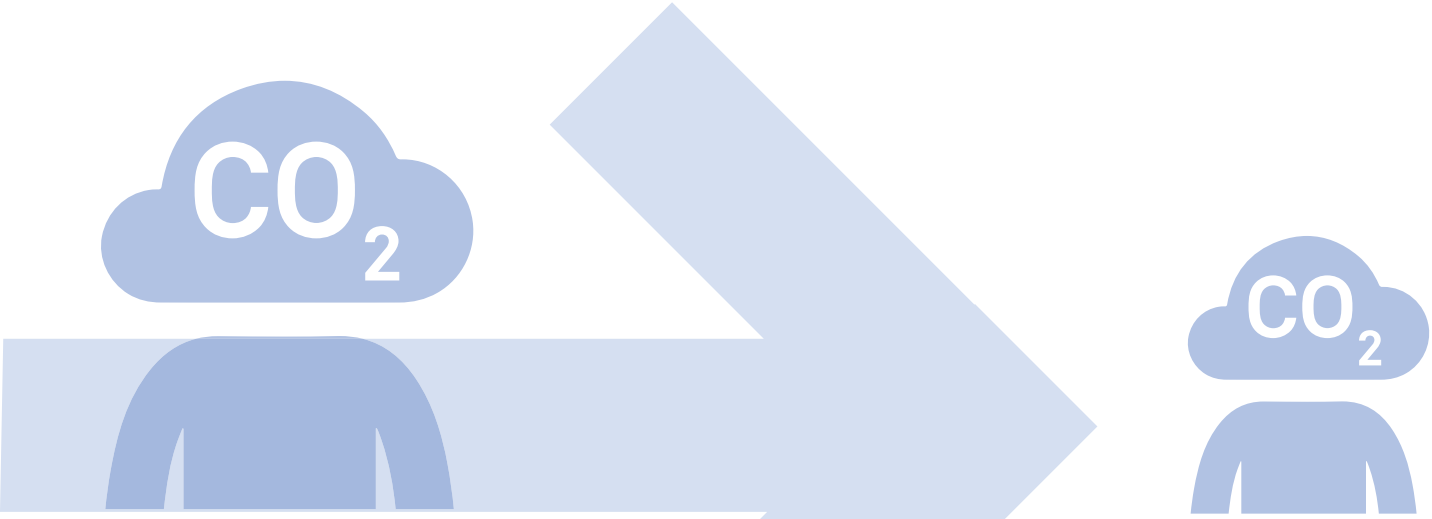
Three working groups have been created within the team to deal with specific questions that require a particular cross-cutting approach:

- **Working group 1 Resilience and Adaptation to Climate Change Plan**, with the aim of identifying the risks and emerging challenges for climate change.
- **Working group 2 Energy efficiency in municipal buildings**, with the aim of reducing consumption in buildings, assessing the options for doing so, and increasing self-production.
- **Working group 3 Energy culture and raising awareness of climate change issues**, with the aim of identifying internal training and communication needs (key players, messages and knowledge that need to be transmitted, existing spaces that can be used, etc.).

In addition to that, specific meetings have been held with municipal technical staff in the areas involved in the Plan and various informative sessions have taken place, along with an internal participatory session involving all the municipal managers to define and agree the Climate Plan measures.


Procés de participació
Principis

8. TRANSITION TO A CARBON-NEUTRAL CITY



Two scenarios have been defined to analyse the future development of energy consumption and emissions in Barcelona up to 2030:

Trend scenario

This considers how energy consumption and related greenhouse gas emissions will evolve, taking into account the predicted behaviour of different context factors (population, GDP, mobility, city vehicle fleet and its renewal, etc.) as well as the anticipated electric mix, with a calculation based on the approach of the Catalan Climate Change Act. Among other things, this foresees:

- Reducing final energy consumption by 2% a year and at least 27% by 2030.
- Reaching 50% renewable energies in the Catalan electricity grid by 2030, and 100% in 2050, with zero fossil-fuel consumption.
- Adopting a plan to close the three nuclear power stations no later than 2027 (Ascó I and II in 2024 and Vandellòs in 2027).

Action scenario

Considers the application of the Climate Plan measures and their effect on reducing energy consumption and emissions compared to the trend scenario. Achieving the action scenario will initiate the path to neutrality in 2050 and necessarily involve a revision of the estimated forecast for the increase in energy consumption and associated emissions.

Projections for context indicators

The following variables were taken into account in calculating energy consumption in the scenarios posed:

- **POPULATION:** the estimated annual population increase between 2016 and 2030 is 0.3%, which means a rise from 1,608,746 to 1,677,047 inhabitants.

- **GROSS DOMESTIC PRODUCT** (GDP): the GDP percentage variations considered from 2018 on reflect the standard trends in economic growth and are not particular to Barcelona. The analysis assumes a moderate a year-on-year growth in GDP between 1.5 and 2%.

- **MOBILITY:** it is estimated there will be a very slight increase in mobility from 2014 to 2030, with an inter-annual rate of 0.4%. With this scenario, in 2030 we would reach 4,500 Mveh/km/year (at the start of the 2000s it was around 5,000 Mveh/km/year).

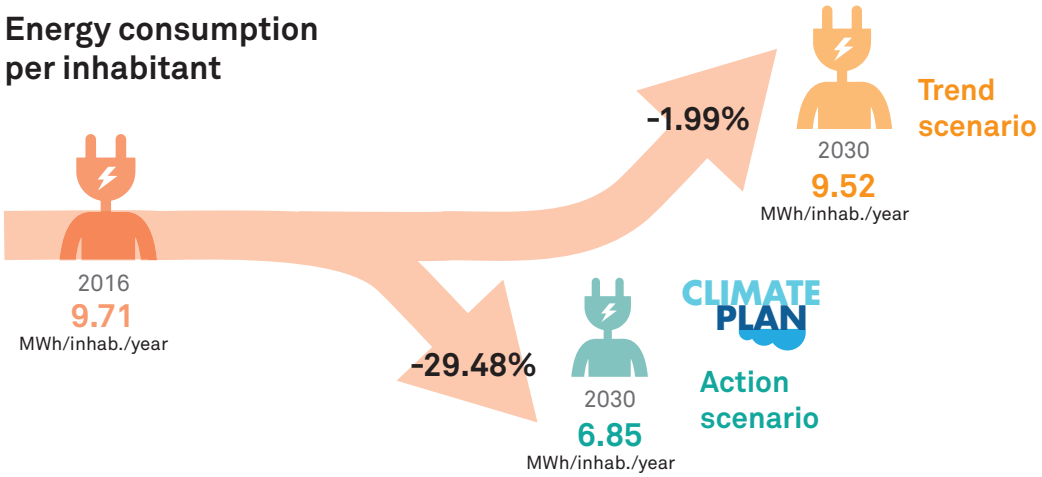
  As regards the energy source, it is estimated that a smaller proportion of vehicles will use diesel compared to petrol in 2030, with a maximum increase in electric vehicles of up to 15% of all vehicles on the road. The Catalan Climate Change Act forecasts e-vehicle registrations will reach 30% in 2025.

- **BUILT SURFACE:** an increase of 1,192,617m^2 is forecast in the residential sector up to 2025, and 2,013,278 m^2 by 2030 compared to the 2014 levels. This is equivalent to a year-on-year rate of 0.2% between 2014 and 2030, in line with the rate of population growth. The estimated increase in the tertiary and industrial sectors is 2,308,482 m^2, with an inter-annual rate of 0.5% between 2014 and 2030.

- **CONSUMPTION INTENSITY:** with regard to the unit energy consumption of households (per unit of surface area or per unit of GDP), it is estimated there will be a slight fall in the consumption of natural gas, due to greater efficiency and the effects of climate change, but an increase in electricity consumption due to the initial effects of climate change (increase in the number of air-conditioning appliances and a more intense use of existing ones) as well as housing having a greater degree of electrification.

The trends considered for the commercial and service sectors are different to those of the residential sector. The effects of climate change on the consumption of natural gas are not as significant, while electricity consumption is affected by efficiency improvements as well. In spite of that, lower energy intensity would not be able to keep energy consumption stable, with this rising as a result of the expected increase in commercial GDP from the further outsourcing of the economy which is forecast.

Energy consumption needs to be reduced more, even though it has stabilised



Trend scenario (2016-2030)

An annual increase of 0.14% is estimated in energy consumption, while **consumption per habitant, as a result of the forecast population increase, will fall by 1.99%**, from 9.71 MWh/inhab. to 9.52 MWh/inhab.

- **By energy source:** there will be a slight increase in the consumption of natural gas (9%) and electricity (13.5%). But there will be an overall fall of 22.7% in automotive fossil fuels and 62.2% in the case of liquefied petroleum gases.
- **By sector:**
  - **Commercial**: it is estimated that this will be the sector that increases its consumption the most, mainly electricity, due to higher demand for air conditioning.
  - **Domestic**: consumption is expected to stabilise after the fall of recent years, despite a rise in electricity consumption due to the proliferation of electronic appliances and more demand for air conditioning.
  - **Industrial**: it is forecast consumption will rise due to higher consumption of natural gas with the economic recovery, although the application of efficiency measures will reduce electricity consumption.

Action scenario (2016-2030)

By applying the Climate Plan measures it is hoped that consumption per inhabitant will be reduced by 29.48%, which is equivalent to an annual fall in energy consumption of 2.46%.

- **By energy source**: it is calculated there will be an overall reduction in natural gas consumption of 13.53%, and 12.8% in electricity consumption. But the reductions are expected to be 63.70% in the case of automotive fossil fuels and 62.21% in the case of liquefied petroleum gases.
- **By sector**: the transport sector will cut back consumption the most (49.44%), followed by commerce (9.44%) industry (5.27%), and the domestic sector (3.35%). The other sectors will see an increase of 9.51%.

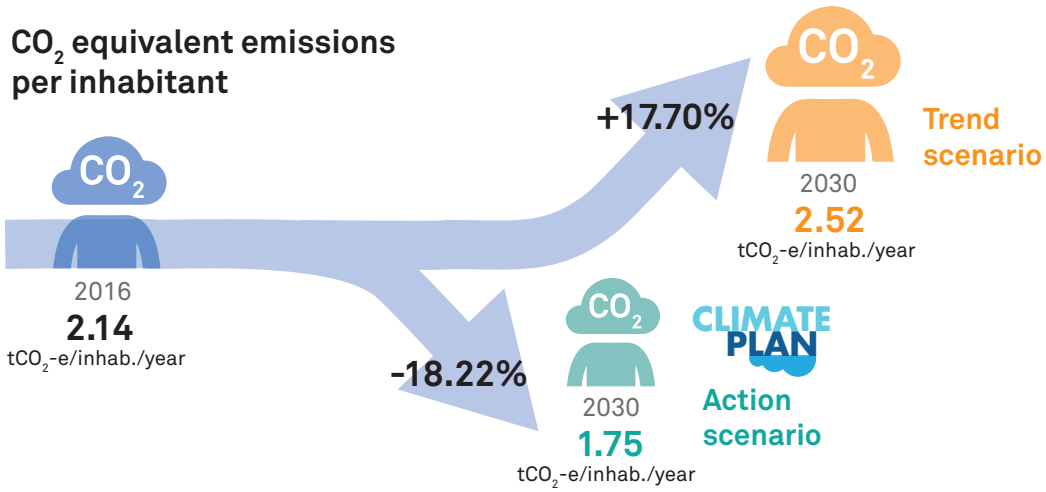
The Climate Plan goes further than the Covenant of Mayors for Climate and Energy. It is more ambitious and targets a 45% reduction in emissions by 2030. By applying the measures envisaged in the Climate Plan up to 2030, Barcelona will be closer to the carbon neutrality target by 2050.

The intermediate target of 2030 will enable us to break the present consumption and emission dynamic and reach 2050 with neutral levels.

If the Climate Plan is not implemented, the trend scenario would, in 2050, put us in the situation we foresee being in by rolling it out in 2030. In other words, we advance 20 years. Also, not implementing the Plan would mean the efforts required would be greater, more costly and less fair.

We are starting to see the uncoupling of energy consumption from GDP growth. In other words, energy intensity is improving. In general, that means economic activity has less environmental impact, a dynamic that should improve in the coming decades as a result of Barcelona becoming carbon neutral in 2050.

If we act now, we will be able to reduce **emissions** more easily and more quickly



Escenari tendencial 2016-2030

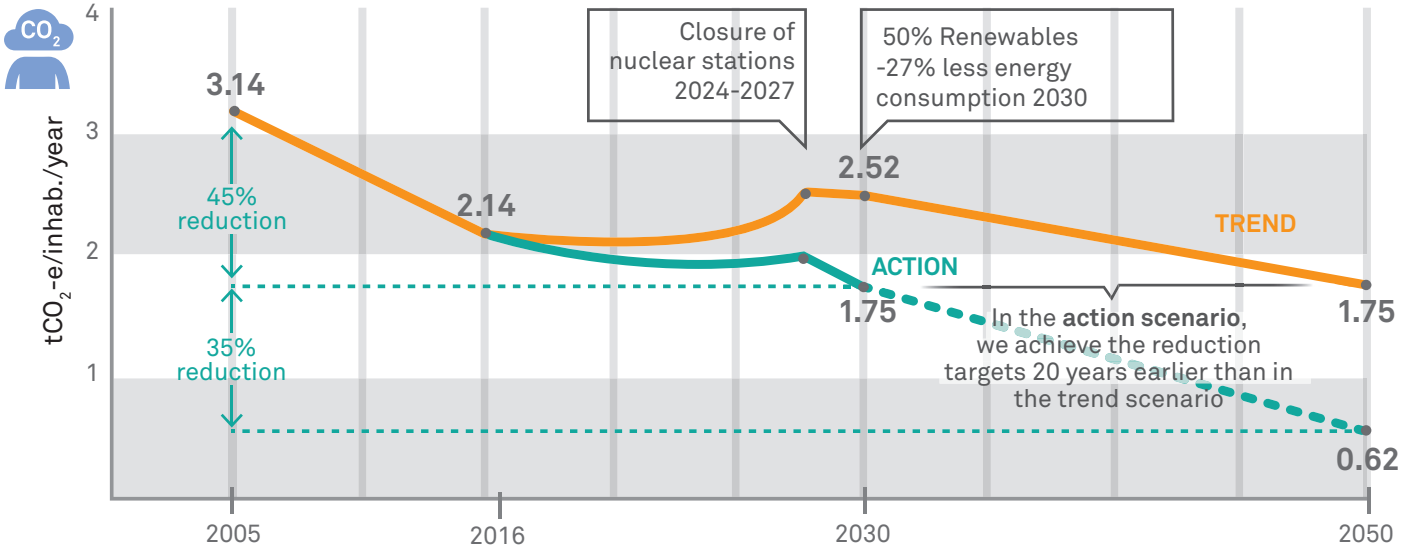
With the closure of the nuclear plants and the more intensive use of renewables envisaged in the Catalan Climate Change Act, the emission factor resulting from power generation (electric mix) will increase, leading to a 17.7% growth in GHG emissions and reaching 2.52 tCO_2-e per inhabitant in 2030.

- **By source:** emissions from natural gas consumption will increase by 9% and those from electricity by 102%, while those caused by the consumption of automotive fossil fuels and LPG will fall 24.52% and 62.2% respectively.
- **By sector**:
  - **Transport**: emissions will be reduced thanks to the renewal of the vehicle fleet (with 15% e-vehicles forecast on Barcelona's roads). Natural gas-powered vehicles will come to the fore because they are best ones for reducing NO_x and PM_{10} emissions, with less impact on air quality than diesel or petrol-powered vehicles.
  - **Waste treatment**: emissions will stay at the same level.

Action scenario (2016-2030)

It is forecast that **implementing the actions in the Climate Plan** will reduce the total emissions for 2016 by 1,158,179 tCO_2-e , which represents **a per capita reduction of 18.22% compared to the 2016 levels (and 45% compared to 2005).**

- **By source**: there will be a very significant reduction in emissions caused by LPG and fossil fuels (62.26% and 65.23% respectively) given the drop in consumption forecast. On the other hand, the emissions associated with electricity consumption will increase by 58.87%. It is also calculated that GHG emissions from solid urban waste treatment will fall by 38.19%.
- **By sector**: only transport and municipal waste treatment will reduce their emissions in the same period, although the reduction will be significant.



9. STRATEGIC GOALS AND TARGETS

New, more ambitious goals and targets for reducing GHG emissions in Barcelona, to honour the commitments undertaken

The new **Catalan Climate Change Act** envisages a transition to an emission-neutral economy with a reduction in greenhouse gases (GHGs) of 40% by 2030, 65% by 2040 and 100% by 2050 compared to the base year of 1990. The Act does not specify the contribution of cities to that target but, to achieve it, Barcelona would have to reduce its GHG emissions per capita by more than 50% compared to 2005 (the benchmark year for the Climate Plan) by 2030.

With regard to the commitments acquired from the **Covenant of Mayors for the Climate and Energy** and the **Barcelona's Commitment to the Climate**, Barcelona would have to reduce GHG emissions per capita by 40% by 2030, compared to 2005.

Finally, Barcelona is also committed to becoming a carbon-neutral city by 2050, together with the other cities that belong to the C40 network.

For all those reasons, the Climate Plan increases the final targets for reducing GHG emissions, compared to the Barcelona's Commitment to the Climate. So it goes further than Barcelona's commitments on a local level (>40%) and aligns itself with the regional target for 2030 set in the Catalan Act (>50%) and carbon neutrality by 2050.

On the other hand, the City of Barcelona commits to update its emissions reduction trajectory, to maintain an up-to-date estimate of residual emissions, and to explore different opportunities to reduce residual emissions on a regular basis.

On the basis of collective action, the city intends to be emission-neutral in 2050 and achieve the following quantitative targets by 2030:

2030

- 45%

Reduce GHG emissions by 45% per capita

compared to 2005 by means of the following measures:

-20% Reduce travel by private motor vehicle by 20%.

x5 Increase solar power generation fivefold.

+20% Renovate, in energy terms, 20% of residential buildings that are over 40 years old.

Increase urban **green space by 1.6 km²**, equivalent to 1 m² more per current inhabitant.

Obtain **100% clean funding.**

-100 l/day

Achieve a domestic potable water consumption rate of less than **100 litres per inhabitant, per day.**

=0

Have **zero energy poverty.**

Allocate **€1.2 milions** in subsidies for collaborative citizen projects (€200,000 every two years).

10. AREAS AND LINES OF ACTION

people's well-being

people first

improved building efficiency

starting at home

transforming public spaces into healthy, biodiverse, efficient and inclusive settings

transforming communal spaces

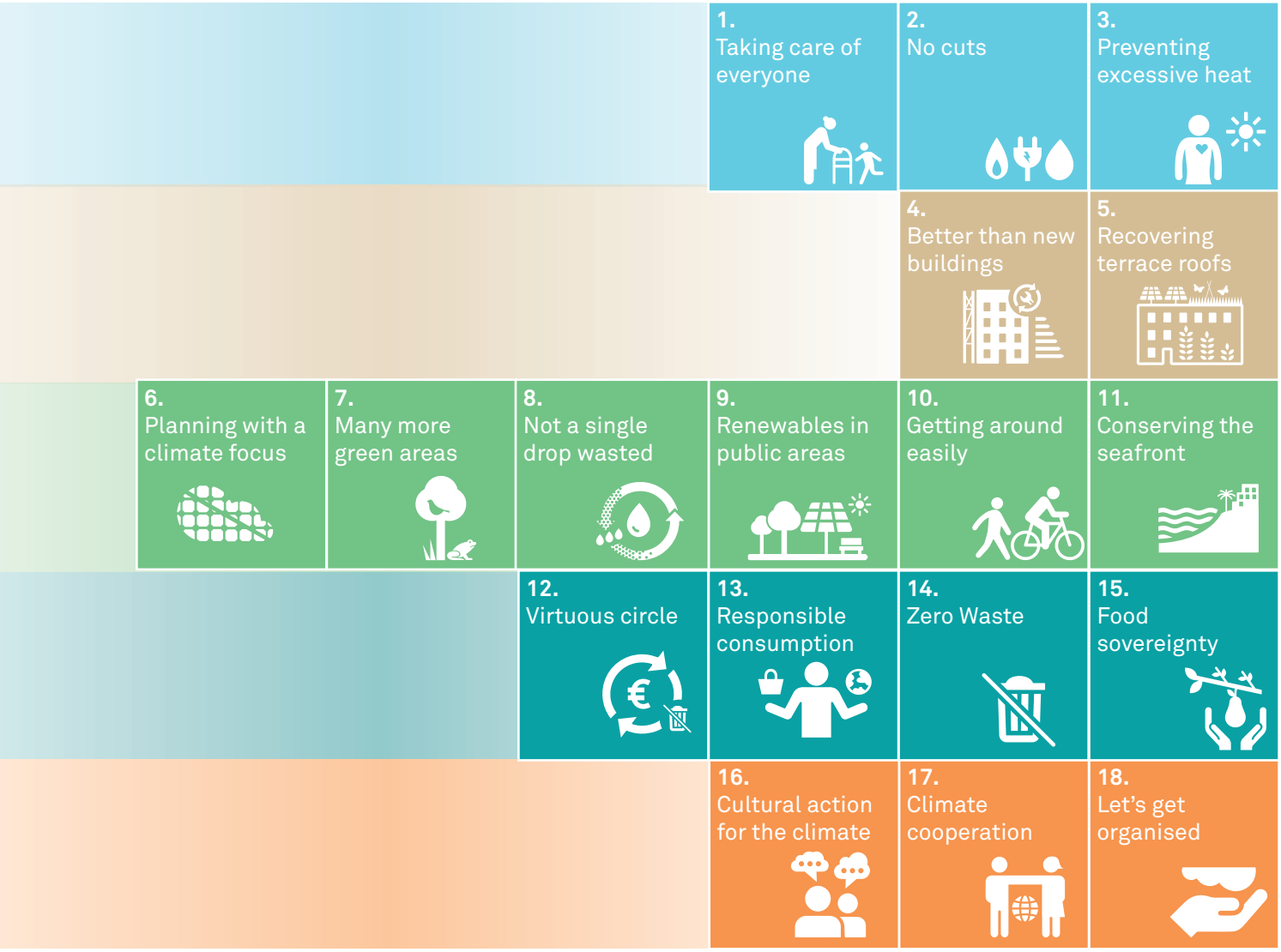
uncoupling the quality of people's lives from economic growth, with a circular vision that makes the most of resources and avoids generating waste and emissions

climate economy

and collaboration from an informed, critical, proactive, empowered citizenry

building together

The Climate Plan has **5 areas and 18 lines of action**. The areas of action correspond to the major issues that the plan is intended to address directly in a cross-departmental way. Each of these areas has a number of quantitative targets that will enable us to assess the plan's progress.

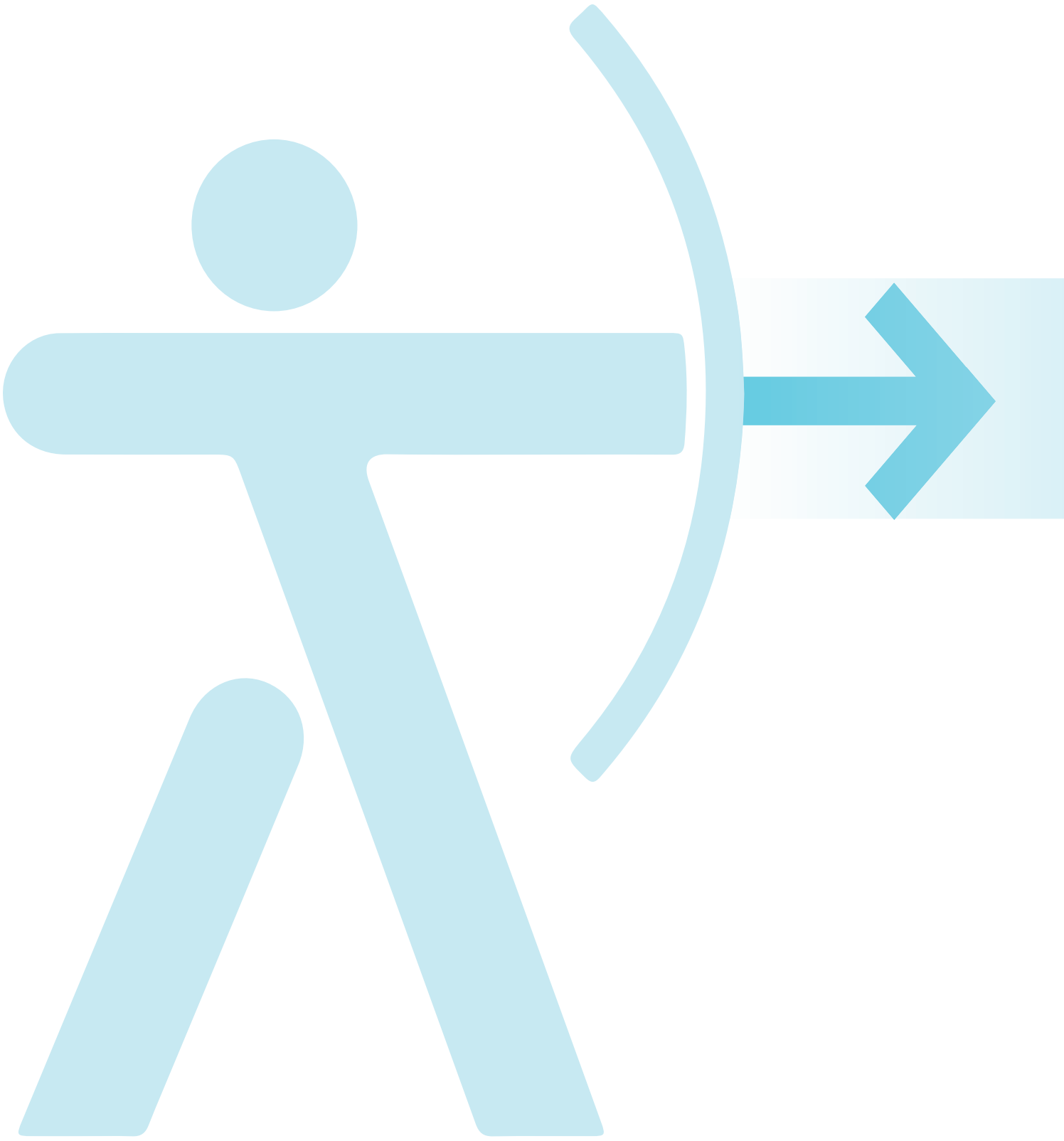


Each of these action lines presents:

- The goal of the line of action
- The justification for it and the expected benefits
- Actions already envisaged in the existing plans
- Necessary short-term actions (2018-2020)
- Necessary medium- and long-term actions (2021-2030)
- An illustrative action as an example
- The key municipal players involved
- The strategic lines of the plan
- The plan's values
- Monitoring indicators
- Associated lines of action

In all, the Climate Plan proposes 242 short-, medium- and long-term measures that need to be applied in the city of Barcelona between 2018 and 2030.

Whether they are implemented correctly will depend on coordination between various City Council areas and their capacity for securing public involvement.



People first

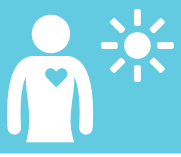
Climate change affects health and quality of life but it does not affect everyone in the same way. Consequently, the Climate Plan cannot respond in the same way to the effects of climate change on the city and its citizens. The measures it proposes have to prioritise the groups that are the most vulnerable to climate change.

Ensuring water and energy supplies are maintained and that critical services and infrastructures are operational, preventing people in vulnerable situations having their supplies cut off, improving the thermal comfort of housing and strengthening social cohesion are some examples of how the Climate Plan proposes to deal with climate change by putting people above all else.

1. Taking care of everyone

2. No cuts

3. Preventing excessive heat



GOALS AND TARGETS FOR 2030:

Zero energy poverty.

100% of the population at least 5 minutes on foot from a climate shelter (facilities and urban parks that provide good thermal comfort conditions and which could shelter sensitive people in the event of heat waves).

94,000 renovated dwellings.

1 water garden per district

Line of action 1

Taking care of everyone

Improving and adapting services, facilities and people's homes, especially those of the most vulnerable to climate change

JUSTIFICATION AND BENEFITS

Climate change affects people in different ways, depending on various factors: their physical condition, health, age, gender and socio-economic situation, the roles and activities they perform, the characteristics of the physical environment they live and work in, and so on.

We need to further analyse how climate change specifically affects each group in order to identify possible risks and vulnerabilities, and define specific actions for responding to them. Existing plans, such as the Neighbourhood Plan or Right to Housing Plan, need to be strengthened and we need to work on improving the thermal comfort of homes and public facilities with specific energy renovation programmes.

Care services for the most vulnerable people, especially health and transport services, need to be strengthened and alternatives found for the activities they find hardest in the most severe weather conditions.

Solutions for vulnerable people and giving an impetus to new, community or local commercial and productive activities can also turn into employment opportunities (e.g. urban green infrastructure, agriculture and food sovereignty, repairing things and giving new value to waste, local manufacturing, energy renovation and installing and maintaining renewable energy systems, or care work).

PLAN ACTIONS

Actions already envisaged in the existing plans

- Barcelona Urban Mobility Plan (2013-2018).
- Bicycle Strategy (2015).
- Barcelona Neighbourhood Plan (2016-2020).
- Plan for Gender justice (2016-2020).
- Right to Housing Plan (2016-2025).
- Creation of energy advice points and guaranteeing basic utility supplies (2016).
- Action Plan to Prevent the Effects of Heat Waves on Human Health (annual).
- Democratising Care (2017-2020).

ILLUSTRATIVE ACTION

Home interior alterations programme for people in vulnerable situations

Barcelona City Council is promoting housing renovation to ensure everyone has a decent place to live in. The new line of grants prioritises energy-saving measures and flat interior improvements.

Renovation grants serve to improve the accessibility and habitability of homes. Improvements are expected to include actions aimed at improving the thermal and acoustic insulation of flats, and making sure they have suitable installations, free of polluting materials.

The purpose of the **programme** is to ensure minimum habitability, safety, security, accessibility, hygiene and energy-efficiency conditions by carrying out basic alterations on housing where people in vulnerable situations have established their usual and permanent place of residence.

The programme covers 100% of renovation expenses, which have to be approved by the Housing Consortium and have an upper limit of €20,000 per dwelling, including VAT. The owner undertakes to refund the full amount if they transfer ownership of the dwelling and, if it is rented out, to maintain the same contractual conditions for at least two years following completion of the work.

Short-term actions (2018-2020)

1.1. **Provide grants and subsidies for housing energy improvements** and prioritise work on the homes of families in vulnerable situations and at risk of social exclusion (annually).

1.2. **Promote the figure of the energy adviser** to advise and help people to improve their energy consumption habits (2020).

1.3. **Strengthen the mobility services** for the most vulnerable neighbourhoods and people (public transport, specific mobility services on demand for people with health problems, e-bicing [public bike-hire service] etc.) (2020).

1.4. **Strengthen** the services for the most vulnerable people at **the Citizen Help and Information Offices (OACs)** to help prevent the effects of heat and other extreme climate events (2020).

1.5. **Improve the social network of elderly people who live alone** and reinforce existing projects (*vincles, radars, etc.*) and specific actions on vulnerable groups in the teleassistance service (2020).

1.6. **Launch the "care-work school"** to offer ongoing training for professional care workers and the relatives of dependent persons (2020).

1.7. **Study the possibility of creating a carer card** to acknowledge the importance of carers, with discounts on public transport and other municipal services (2020).

1.8. **Design pilot projects for social superblocks**, geared towards providing a comprehensive care service for dependent persons using local home-care service teams (2020).

Medium- and long-term actions (2021-2030)

1.9. Adapt and **improve the care services** to help people face the impacts of climate change on health (2025).

1.10. **Create an advice centre and information space on the care economy** (2025).

1.11. **Incorporate the climate variable in care work**, adapting existing services and starting up new ones (2025).

1.12. **Help provide employment** for people in emerging sectors linked to the green, solidarity and circular economy, especially the most vulnerable, and give the Labora project an environmental vision (2025).

1.13. **Renovate housing** improving insulation, replacing obsolete electrical installations, optimising the power contracted and facilitating access to more efficient electrical appliances, paying special attention to the most vulnerable households (2030).

1.14. **Reduce the nuisance caused by bad smells** by improving waste collection and sewage systems in the event of hot weather (2030).

1.15. **Extend the introduction of social superblocks** to the whole of the city, expand the local services to groups with dependent persons and strengthen all care services (2030).

MUNICIPAL PLAYERS INVOLVED

- Social Rights.
- Urban Ecology.
- Housing.
- Districts.
- Barcelona Public Health Agency.
- Barcelona Health Consortium.
- Barcelona Education Consortium.

STRATEGIC LINES OF THE CLIMATE PLAN

Mitigation | **Adaptation** | **Climate justice** | **Promoting citizen action**

ASSOCIATED LINES OF ACTION:

No cuts | Preventing excessive heat | Better than new buildings | Recovering terrace roofs | Planning with a climate focus | Many more green areas | Not a single drop wasted

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
- HABITABLE BCN
- HEALTHY BCN
- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS

MONITORING INDICATORS

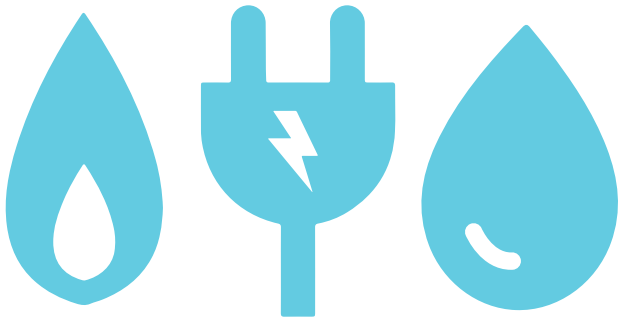
- Number of renovated dwellings incorporating energy efficiency criteria.
- Number of interventions in households incorporating energy efficiency criteria.
- Number of people benefiting from grants and subsidies.
- Number of journeys made in specific transport services for vulnerable people.
- Number of jobs created.

Renewables in public areas | Getting around easily | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | Cultural action for the climate | Climate cooperation | Let's get organised

People first

Line of action 2

No cuts



Guaranteeing energy rights for all Preventing gas, water and electricity supplies being cut off, especially for the most vulnerable people

JUSTIFICATION AND BENEFITS

Climate change could have consequences for the population's access to basic utilities (water and energy), given the increased possibility of critical parts of the supply systems being exposed to natural hazards and its impact on the availability of water resources or the need to switch to renewable energy resources, as well as the possible changes in consumption patterns or increased demand it might give rise to. Effort needs to be put into ensuring the continuity of these services and universal access to basic water and energy supplies, despite the negative impact of these factors.

In the case of people at risk of social exclusion, Act 24/2015 bans utility companies from cutting off supplies where the failure to pay utility bills results from a lack of financial resources. They are now legally obliged to maintain their gas, water and electricity supplies to customers for as long as they remain in a vulnerable situation or financial difficulty.

And to guarantee the public's rights in relation to utility companies, Barcelona City Council has set up some energy advice points (PAEs) in each district that offer help and information and intervene to prevent supplies being cut off, as well as ensure the utility companies do not deny anyone access to any utility. They also offer the general public information on reducing bills, improving energy efficiency in the home and the grants available for that, and installing solar energy systems in buildings.

Barcelona City Council seeks to guarantee basic gas, water and electricity supplies for everyone.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Creation of energy advice points and guaranteeing basic utility supplies (2016).
- Transition towards energy sovereignty (2016).
- Plan for Gender justice (2016-2020).

ILLUSTRATIVE ACTION

Barcelona City Council's energy advice points

Energy advice points are a Barcelona City Council service that offer people the help, information and intervention they need to exercise their energy rights and prevent companies from denying them access to basic utilities.

In addition they advise the general public on processing social bonds, grants for improving energy efficiency in the home and cutting utility bills.

Short-term actions (2018-2020)

2.1 Promote actions and agreements to **ensure the public supply of potable water** in the city for everyone, at a fair price and with a guarantee of quality, quantity and continuity (2018).

2.2 **Review the domestic sewage tax** so it includes discounts for sensitive groups (2018).

2.3 Work on responding to people's supply needs while improving consumption efficiency, as well as **guaranteeing everyone's basic, essential consumption of potable water, gas and electricity**, with a special emphasis on people at risk of social exclusion (2018).

2.4 **Set up a municipal energy marketing company** at the service of everyone (2018).

2.5 **Deploy the municipal energy operator** which will drive renewable energy production in the city and facilitate its installation in public and private spaces (2020).

2.6 **Improve our knowledge of the relationship between energy poverty and health**, by means of the Health Survey and specific studies that provide indicators (2020).

2.7 **Reinforce the energy advice points (PAEs)** which offer people the help, information and any intervention they need so they can exercise their energy rights, and utility companies cannot deny them access to basic utility supplies. Promote social bonds through the PAEs, as well as renewable energy consumption and grants for improving energy efficiency in the home, and empower people so they consume energy responsibly and rationally (2020).

Medium- and long-term actions (2021-2030)

2.8 **Promote and prioritise self-produced energy using renewable sources** and also make this accessible to vulnerable households (ongoing).

2.9 **Promote "energy banks"** that can help to cover the needs of energy-vulnerable households (2025).

2.10 **Study the impact that climate change could have on the price of basic supplies and food** (2025).

2.11 **Guarantee water and energy supplies and uninterrupted service of various critical facilities and infrastructures** (health centres, social services centres, schools, residences and so on) during emergency situations (extreme heat, flooding, power cuts, water shortages, etc.) (2030).

MUNICIPAL PLAYERS INVOLVED

- Social Rights.
- Urban Ecology.
- Housing.
- Districts.

STRATEGIC LINES OF THE CLIMATE PLAN

Mitigation | Adaptation | Climate justice | Promoting citizen action

ASSOCIATED LINES OF ACTION:

Taking care of everyone | Preventing excessive heat | Better than new buildings | Recovering terrace roofs | Planning with a climate focus | Many more green areas | Not a single drop wasted

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
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- HEALTHY BCN
- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS

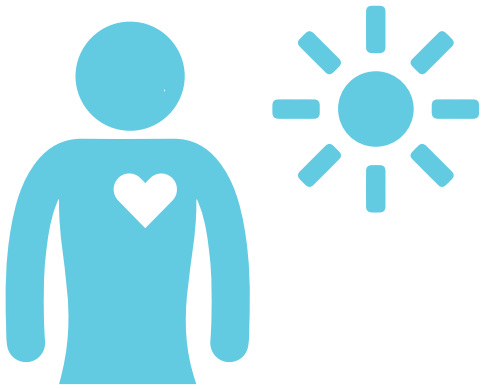
MONITORING INDICATORS

- Number of households advised at the energy advice points.
- Number of households that have had their basic utilities cut off (gas, water and electricity).
- Number of facilities and critical infrastructures whose service has been interrupted during emergency situations.

Renewables in public areas | Getting around easily | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | Cultural action for the climate | Climate cooperation | Let's get organised

Line of action 3

Preventing excessive heat



Improving thermal comfort in the city's public spaces and buildings and creating a network of places to take shelter in high temperatures, to protect people's health and provide special care for the most vulnerable groups

JUSTIFICATION AND BENEFITS

Barcelona has suffered eight heat waves in the last 34 years. However, according to the Meteorological Service projections for Barcelona and at the end of the century, they could be significantly more frequent with between one and four a year, depending on the scenario considered. More tropical nights (temperatures above 20ºC) and torrid nights (temperatures above 25ºC) are also forecast, as well as days with extreme temperatures above 35ºC.

High temperatures directly affect people's health, especially those in vulnerable conditions, such as the chronically sick, elderly people and young children, as well as everyday activity in the city and energy consumption patterns. It also needs to be borne in mind that they have an unequal impact on the city, depending on factors such as the state of buildings, the presence of vegetation and socio-economic parameters, among others.

The effects of climate change depend on the district and neighbourhood too. For example, the highest daytime temperatures are found in Les Corts, Eixample Esquerra, Nou Barris and Ciutat Vella, while the areas with the lowest temperature are next to the coast, thanks to the thermoregulatory effect of the sea. However, at night the situation is reversed, with the highest temperatures recorded on the coast.

So we need to prepare the city to cope with high temperatures by intervening in buildings and public spaces, and also anticipate incorporating and improving services and facilities for the general public during extreme episodes, paying special attention to the most vulnerable.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Action Plan to Prevent the Effects of Heat Waves on Human Health (annual).
- Barcelona Green Infrastructure and Biodiveristy Plan (2013-2020).
- Urban resilience (2016).
- Barcelona Neighbourhood Plan (2016-2020).
- Plan for Gender justice (2016-2020).
- Programme to Promote the City's Urban Green Infrastructure (2017).
- Tree Master Plan (2017-2037).
- Plan for Energy Saving and Improvements in Municipal Buildings (2017-2020).

ILLUSTRATIVE ACTION

Action protocols for heat waves, in order to protect the most vulnerable people

In the Specific Municipal Emergency Plan for Heat Waves, Barcelona City Council includes various measures to protect people who are vulnerable to the consequences of extreme temperatures. In fact, the heat wave action protocols are automatically kept at the preventive stages from 15 June to 15 September. These stages launch various preventive actions that are activated before the alert stage is reached.

- Staff from the Council's primary-care social services, home-care teams and homeless people care centres receive information and training.
- The general public is informed of what heat waves are and offered advice on how to avoid their effects, in leaflets provided at social services centres, at municipal facilities for the elderly and on the city's beaches.
- The list of vulnerable individuals and individuals and families at risk is updated at every social services centre and through the Catalan health ministry.
- The list of care resources and air-conditioned day centres is updated.
- Vulnerable people receiving home-care services are informed of the steps they need take to protect themselves from the effects of a heat wave.
- A 24-hour helpline, to provide information to those who call, run in coordination with the medical services when health problems are detected, goes into service .

Short-term actions (2018-2020)

3.1 **Review the Action Plan for Preventing the Effects of Heat Waves on Health**, in view of the results of the future climate projections for Barcelona (activation thresholds taking minimum temperatures into account, the need to strengthen actions and services, etc.), and incorporate a territorial vision that includes vulnerability. Establish appropriate protocols for work outdoors in temperatures above 30ºC. Assess their effectiveness (2020).

3.2 **Identify existing and potential climate shelter spaces**: public and private facilities and public spaces (e.g. parks and gardens) which could provide conditions for thermal comfort in extreme episodes and establish the services linked to the heat wave action protocols that these spaces need to offer, aside from quantifying the extra resources required (parks open 24 hours, use of "greened" school playgrounds, block interiors, etc.). Map the degree of cover to ensure territorial fairness and take into account the areas identified as the most vulnerable to heat (2020).

3.3 **Prioritise the cooling actions** (more green infrastructure, converting lakes and fountains to make them accessible, etc.) to be carried out **in the territorial areas most vulnerable to heat** (2020).

Medium- and long-term actions (2021-2030)

3.4. **Deepen our knowledge of how climate change affects the health** and mortality of people in each neighbourhood, through the European research project funded by Climate-fit.city, in which the ASPB and ISGLOBAL participate (2025).

3.5. **Deepen our knowledge of the urban climate** by installing a network of fixed weather stations (to collect data that would enable us to know what its effect is on health and other sectors of interest) and occasional or mobile ones (that would enable us to evaluate the effectiveness of the measures applied, such as measuring climate variables before and after pilot interventions in urban space, especially in the settings identified as the most vulnerable) (2025).

3.6. **Create the "Barcelona, city of shade" programme**, for intervening in public space to create more shaded areas, by increasing the green cover or installing urban furniture, preferably multifunctional (e.g. photovoltaic pergolas that generate energy), or ephemeral or seasonal textile elements. Identify and map itineraries. Foster the creation of shade in free private spaces (2025).

3.7. **Create water gardens** (sprinklers, accessible fountains, lakes, swimming pools, etc.) with children's games that combine permanent actions with ephemeral or seasonal ones. These gardens will have to be assumable as regards water consumption, comply with all the necessary sanitary requirements and be spread equally around Barcelona (2030).

3.8. **Improve the thermal comfort of climate shelter facilities**, with priority interventions in those that serve the most vulnerable population (nurseries, schools, residences, etc.), without that meaning an increase in energy consumption wherever possible (by using passive measures such as crossed ventilation, better insulation, darkening with dissipated natural light or geothermal cooling, among others) (2030).

3.9. **Create new climate shelter spaces** (green spaces or facilities) to ensure territorial cover (2030).

3.10. **Increase health service staff to deal with heat waves** (2030).

3.11. **Take action to increase the reflectance index of city pavements and terraces** and help to mitigate the urban heat island effect (2030).

MUNICIPAL PLAYERS INVOLVED

- Urban Ecology.
- Districts.
- Safety and Prevention.
- Social Rights.
- Enterprise, Culture and Innovation.
- Barcelona Public Health Agency.
- Barcelona Health Consortium.
- Education Consortium.

STRATEGIC LINES OF THE CLIMATE PLAN

Mitigation | **Adaptation** | **Climate justice** | Promoting citizen action

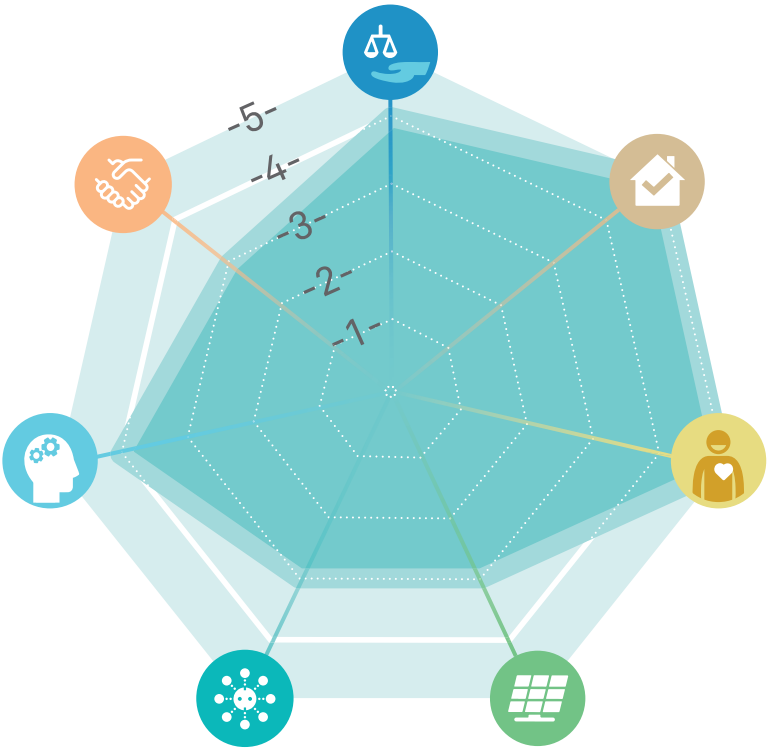
ASSOCIATED LINES OF ACTION:

Taking care of everyone | No cuts

Better than new buildings | Recovering terrace roofs | Planning with a climate focus | Many more green areas | Not a single drop wasted

VALUES OF THE CLIMATE PLAN

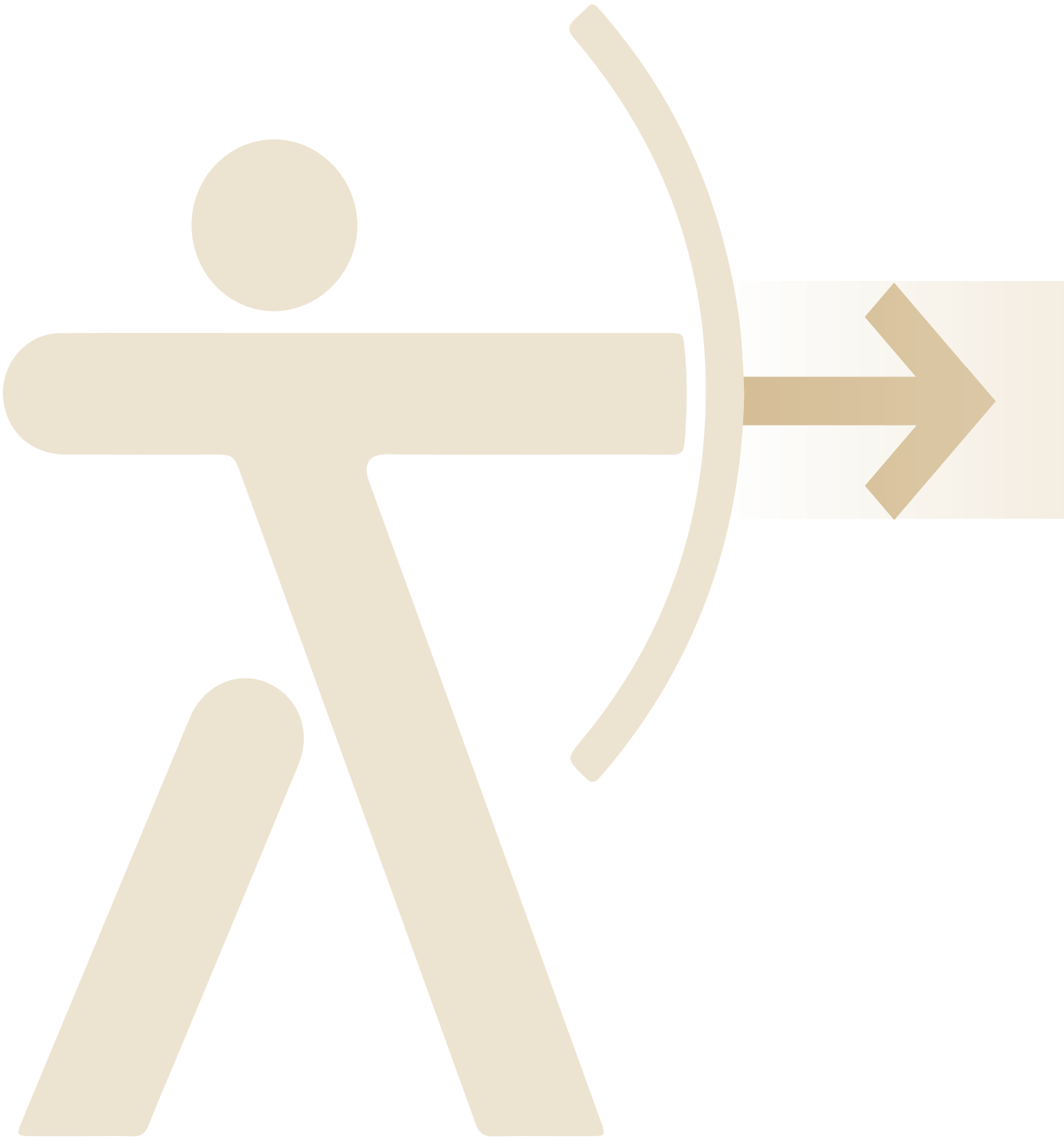
- SOCIALLY FAIR BCN
- HABITABLE BCN
- HEALTHY BCN
- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS



MONITORING INDICATORS

- Number of places to shelter that have been identified and set up.
- Degree of cover these places offer.
- Energy consumed by shelter facilities (kWh/m^2).
- Number of times the Heat Wave Protocol is activated.
- Increase in the city's tree cover (%).
- Heat-related morbidity and mortality.
- Number of water gardens.

Renewables in public areas | Getting around easily | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | Cultural action for the climate | Climate cooperation | Let's get organised



Starting at home

Buildings consume a great deal of energy. But they can also be productive and independent, and generate energy from renewable sources installed on roof terraces, party walls or facades.

The Climate Plan forecasts the energy renovation of existing buildings on a massive scale and new buildings which are exemplary in that respect, with more locally produced solar energy, so we can get closer to a self-sufficient model and buildings with almost zero consumption. These actions will enable energy to become more accessible and more affordable to everyone. Roofs, walls and facades can be used to plant vegetation, retain rainwater, generate energy and create meeting places.

4.
Better than new buildings

5.
Recovering terrace roofs

GOALS AND TARGETS FOR 2030

- Renovate 20% of residential buildings that are over 40 years old.
- Reduce the 7% of GHG emissions associated with the energy consumption of municipal buildings and facilities.
- Reach 34,100 m^2 of green roofs, walls and facades.
- Install 100 emblematic productive roofs or facades on municipal public buildings.

Line of action 4

Better than new buildings

Stepping up action to improve energy efficiency in buildings and facilities in order to reduce their energy demand, optimise energy consumption and boost self-consumption, leading to buildings with almost zero consumption

JUSTIFICATION AND BENEFITS

The domestic, commercial and service sectors account for nearly 60% of all energy consumed in the city, with a final energy consumption of around 10,000 GWh a year. In terms of greenhouse gases, that represents 40% of all emissions recorded in the city. And a large part of that consumption corresponds to the buildings where the activity is carried out.

The built surface area in Barcelona in 2014 was 124.5 million m^2, 16% more than in 1999. Over half of that corresponded to the residential sector (64 million m^2), followed by industrial sector premises, warehouses and car parks (25 million m^2). Also noteworthy is the surface area dedicated to offices and the commercial sector (7.3 and 8.4 million m^2 respectively).

As regards energy, 106,400 existing buildings and 240 new-build buildings have been energy-certified (2015). However, those figures only correspond to a percentage of all the buildings in the city. Categories D and E account for 58.2% of certifications, while 36.4% have a consumption and emissions above the average for the existing stock (categories F and G), 5.2% are in the efficient categories (B and C) and only 0.2% are very efficient (category A). In the case of new-build buildings, 38.3% have a D or E rating, 45.8% are efficient buildings (B and C) and only 15.8% are very efficient (A).

These percentages show that new-build buildings are more efficient and that there is considerable potential in existing buildings for improving energy efficiency and reducing greenhouse gas emissions.

The average age of residential buildings is more than 65 years, so they do not comply with today's standards and require a lot of energy. In fact, 72% of the surface area of residential buildings was built before 1979, in other words before thermal standards were introduced.

In that context, the energy renovation of buildings, dwellings and facilities takes on enormous importance. Renovating existing housing and buildings should enable a reduction in energy demand and, consequently, mean less effort on the part of families to cover their energy costs, a key issue, especially in the more vulnerable parts of the city.

Although there are specific energy regulations for new buildings, they are often based on the technology itself and not the features. Therefore, we need to promote the construction of efficient buildings and facilities and make sure they produce part, if not all the energy they require and, in that way, obtain buildings with almost zero consumption.

We also need to work on developing regulations adapted to the city's reality and ensure they are a applied and complied with, as well as on tools (both administrative and economic, including incentives and discounts, among others), so the action on construction is effective and builders assume their responsibility as far as reducing consumption and emissions in the city is concerned.

From a municipal perspective, buildings and facilities account for more than 50% of municipal energy consumption. So the City Council has to continue its efforts to secure energy improvements in the existing stock and thus set an example of the possibilities that exist. It is also important to show that buildings can generate part of their energy needs and, in that regard, the City Council needs to pursue its policy of installing power generation systems in public buildings

to demonstrate their viability, while encouraging private owners to do likewise. One example of this is the Programme to Promote Solar Power Generation in Barcelona.

So, acting on construction quality and building features, as well as on how they behave in energy use and management terms, at all levels and in all sectors (residential, commercial, service, public and industrial), and ensuring proper maintenance, with the necessary degree of specialisation and resources, are key factors in achieving significant reductions in final energy consumption and, consequently, in the associated emissions. That also requires the contribution of an empowered citizenry aware of the need to change their habits and consume less more efficiently, an area where there is a long way to go, both on a public and a private level.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Barcelona Neighbourhood Plan (2016-2020).
- Plan for Energy Saving and Improvements in Municipal Buildings (2017-2020).
- Programme to Promote Solar Power Generation in Barcelona (2017-2019) and subsequent editions (2020-2030).

ILLUSTRATIVE ACTION

Can Portabella, a renovated facility

The renovation of the Can Portabella civic centre shows how the incorporation of energy efficiency criteria, prioritising the use of wood, gives the building a thermal inertia that ensures warm temperatures in winter and cooler temperatures in summer. Twelve centimetres of wood fibre provide external insulation for the facade and a large side window allows natural light into all the rooms practically the whole day. There is a ventilated roof with 24 cm of recycled cotton insulation that collects photovoltaic power. The battery-powered lift enables considerable energy saving on one of the building's main energy consumers. And, in addition to all that, it has a natural light well and paved insulation in the floor.

Can Portabella ended 2016 with a positive energy balance, as it produced more than it consumed. This model is an example for future projects, as the City Council's aim is to work along these lines to ensure efficiency and minimise energy expenditure in all municipal facilities.

Short-term actions (2018-2020)

4.1. **Set up a municipal energy marketing company** at the service of everyone (2018).

4.2. **Promote actions and tools for energy improvements in Barcelona's commercial sector** (2018).

4.3. **Deploy the municipal energy operator** which will drive renewable energy production in the city and facilitate its installation in public and private spaces (2020).

4.4. **Increase grants and subsidies for renovating buildings** with sustainable criteria and for implementing energy improvements, both passive and active elements (for new installations and for the renovation of existing ones) in buildings (annually).

4.5. **Provide tax incentives for incorporating energy efficiency measures** that go further than the regulatory requirements (annually).

4.6. **Undertake communication and publicity activities to encourage energy savings in buildings:**

- Energy-saving marathon involving awareness-raising tasks among council workers (and centre users or visitors) in various kinds of municipal buildings (2018).
- Tactical communication actions (ongoing).
- Environmental educational workshops (ongoing).
- Consolidation of the energy resources map (2018).
- Publication of handbooks for the public and professionals on developing power generation facilities (2018).
- Publication of a manual on the procedure for connecting generation systems for self-consumption (2018).
- Dissemination of advice and tools to foster energy saving (energy calculator) (2018).

4.7. **Study traditional energy solutions** (balcony window doors, ventilated roofs, etc.) and how to fit them into the modern building context (2020).

4.8. Study and **establish the technical specifications for the new thermal comfort standards** that Barcelona wants to achieve locally, and work on changing the mentality of building promoters and users (2020).

4.9. **Analyse how long it will take for new, more environmentally responsible systems to be able to compete with traditional systems** and what the cost-benefit result will be in economic, social and environmental terms (2020).

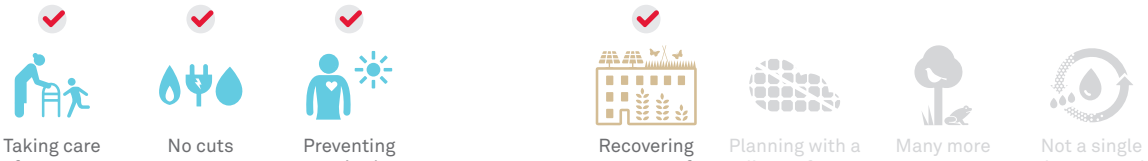
4.10. **Monitor the energy performance of buildings, housing and public facilities** to provide knowledge of their consumption and the energy improvements applied (ongoing).

Medium- and long-term actions (2021-2030)

4.11. **Study building systems and solutions** adapted to Barcelona **to improve their protection against heat and passive cooling**, and supplement the current building regulations in force by establishing local technical and regulatory specifications. Incorporate criteria for protecting buildings against climate episodes (e.g. strong winds) (2025).

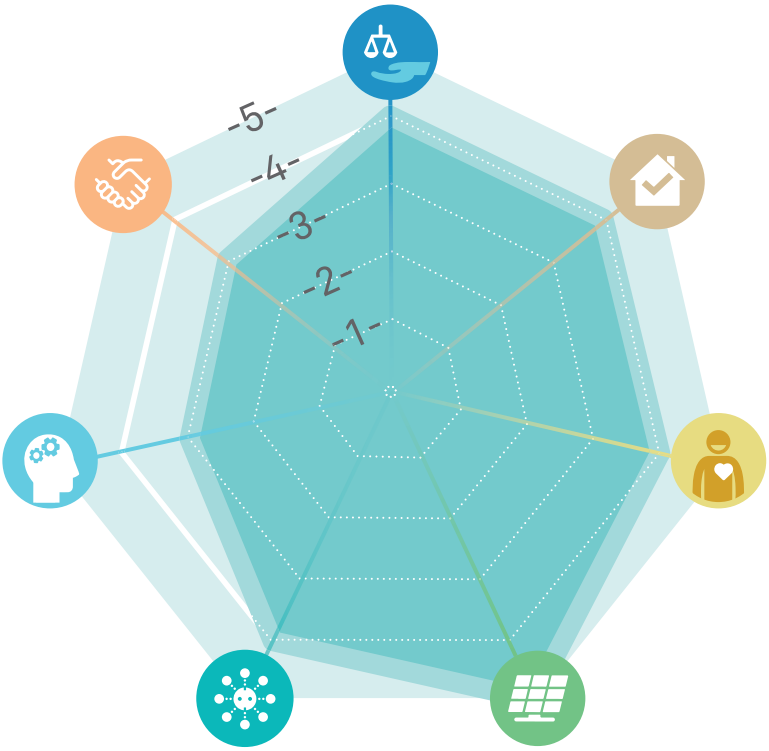
4.12. **Draft and enforce an energy by-law on building features** that boosts the market and exemplifies the city's commitment to reducing energy consumption along with emissions of greenhouse gases and local pollutants, and which also prioritises the use of sustainable materials and an energy supply based on residual sources (heating and cooling grids) (2030).

ASSOCIATED LINES OF ACTION:



VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
- HABITABLE BCN
- HEALTHY BCN
- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS



MUNICIPAL PLAYERS INVOLVED

- Urban Ecology.
- Housing.
- Enterprise, Culture and Innovation.
- Resources.
- Districts.
- Social Rights.
- Administration and Economy.

STRATEGIC LINES OF THE CLIMATE PLAN

- Mitigation
- Adaptation
- Climate justice
- Promoting citizen action

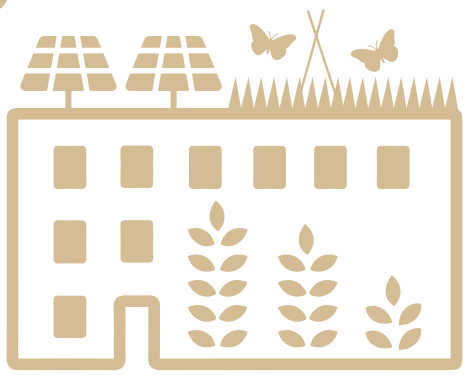
MONITORING INDICATORS

- Number of building renovations carried out.
- Number of grant requests processed.
- Number of buildings with A and B energy ratings.
- Solar / photovoltaic power installed.

Renewables in public areas | Getting around easily | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | **Cultural action for the climate** | Climate cooperation | **Let's get organised**

Line of action 5

Recovering terrace roofs



Promoting roofs, walls and party walls that provide social and environmental services with added value

JUSTIFICATION AND BENEFITS

A dense, compact city such as Barcelona has to make the most of every square metre to correct the adverse effects of climate change. The use of roofs, walls and party walls as productive spaces opens up new urban spaces for thermal activities and various uses, with the dual aim of mitigating the effects of climate change and adapting to it by involving the general public. Terraces, on flat and slightly inclined roofs, account for 67% of total roof surface area in the city, which is 1,764.4 ha.

Those surfaces, together with those of the facades, become potential settings for providing socio-environmental services with added value because they offer the possibility of:

- Generating renewable energy (energy roof)
- Adding plants and biodiversity (green roof)
- Growing food (food roof).
- Storing water (reservoir roof).
- Cooling the city (cool roof).
- Providing a social use (active roof).

There have already been several initiatives promoting productive roofs in Barcelona, such as a number of studies on green roofs, a government measure promoting living terraces and green roofs in the city, the publication of the Guide to Living Terraces and Green Roofs or the Programme to Promote Renewable Energy Generation (2017-2019) and various lines of subsidies.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Barcelona Green Infrastructure and Biodiveristy Plan (2013-2020).
- Promoting living terraces and green roofs in Barcelona (2014).
- Programme to Promote the City's Urban Green Infrastructure (2017).
- Programme to Promote Solar Power Generation in Barcelona (2017-2019) and subsequent editions (2020-2030).

ILLUSTRATIVE ACTION

Agriculturally productive green roof at the Vall d'Hebron-Teixonera market

Remodelling the market (with a municipal investment of €10 million) consists of increasing the building's volume, redesigning the basement and ground floor, and redeveloping its surroundings. It also includes the addition of a productive agricultural roof with a surface area of 1,400 m^2.

Work is being done to commission a social organisation to manage it, through the employment promotion network set up by the Horta-Guinardó District Council.

Project coordinated by the Barcelona Municipal Institute of Markets and the District Council.

Short-term actions (2018-2020)

5.1. **Draw up a by-law to promote productive roofs** for new-build buildings, major renovations and buildings that undergo a change of use, which includes incentives and a proposal for the necessary regulatory changes to allow agriculture and construction elements on roofs, and which includes a maintenance commitment (2018).

5.2. **Draw up technical guidelines for public buildings that include the use of productive roofs, walls and facades** (2018).

5.3. **Set up a municipal energy marketing company** at the service of everyone (2018).

5.4. **Increase grants and subsidies for power generation and other types of productive roofs** based on using solar energy (for new installations and renovation of existing ones) in buildings, and ensuring a maintenance commitment (annually).

5.5. **Promote tax rebates for** installing solar power generation systems that do more than comply with the regulations and study other possible rebates for other types of **productive roofs** (annually).

5.6. Consolidate the green roof competition: one roof per district (annually).

5.7. **Promote initiatives that publicise and tell people about productive roofs:**

- An interactive map of existing and potential productive roofs and walls where each type of roof could be installed, for public consultation (2020).
- A catalogue of existing roofs, with videos and experiences (2020).
- Collaborative mappings (ongoing).
- A design for an identification symbol on the facade of public buildings with an accessible roof (2020).

Medium- and long-term actions (2021-2030)

5.8. **Offer technical advice on productive roofs and walls** at the energy advice points, housing offices and other existing services (2025).

5.9. **Increase photovoltaic generation on industrial roofs** linked to rolling out the Strategic Master Plan for the Llobregat Delta Economic Platform, as well as others (2025).

5.10. **Promote rainwater collection and its reuse in buildings** (2030).

MUNICIPAL PLAYERS INVOLVED

- Urban Ecology.
- Housing.
- Enterprise, Culture and Innovation.
- Districts.

EIXOS ESTRATÈGICS DEL PLA CLIMA

Mitigation

Adaptation

Climate justice

Promoting citizen action

ASSOCIATED LINES OF ACTION:

Taking care of everyone

No cuts

Preventing excessive heat

Better than new buildings

Planning with a climate focus

Many more green areas

Not a single drop wasted

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
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MONITORING INDICATORS

- Number of productive roofs built, by type.
- Surface area (in hectares) of productive roofs built, by type.
- Solar power generation (kilowatts per hour, number and type of installations, square metres of thermal solar surface area, and photovoltaic picowatts).

Renewables in public areas | Getting around easily | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | **Cultural action for the climate** | Climate cooperation | Let's get organised

Transforming communal spaces

City planning also requires a climate approach where energy efficiency and self-consumption are key elements, and which also fosters cycling and pedestrian mobility.

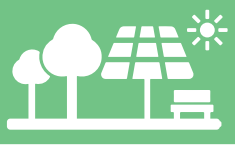
The Climate Plan encourages planners to incorporate a metabolic logic in urban space planning, to ensure that it not only functions but is also functional and guarantees people's well-being at the same time. Creating much more green space and infrastructure in the city, making use of alternative water resources to cut potable water consumption, solar power generation, healthier and more sustainable mobility, and the conservation of the coastline are all strategies that need pursuing.

6. Planning with a climate focus

7. Many more green areas

8. Not a single drop wasted

9. Renewables in public areas



10. Getting around easily

11. Conserving the seafront

GOALS AND TARGETS FOR 2030

Reduce GHG emissions per capita by 45% compared to 2005.

Achieve 1.6 km² more green space and infrastructure.

- Increase tree cover by 5% (2037).
- Increase adapted tree species from 30% to 40%.
- Reduce private motor vehicle travel by 20%.
- Increase solar power generation fivefold.

Reduce domestic drinking water consumption to 100 l/inhab/day

- Increase the use of underground water by 2.7 hm^3.
- Achieve 18 hm^3 additional potable water in collaboration with other authorities (2050).
- 100% procurement of low-carbon public transport buses, taxis and municipal fleets (2025).
- Have 95% of the population at less than 300 m from a bike lane (2018).

Line of action 6

Planning with a climate focus

Incorporate the climate variable in urban planning

JUSTIFICATION AND BENEFITS

The way we plan and design the city, both public spaces and buildings, is a key factor in how it can reduce greenhouse gas emissions and respond to the effects of climate change. Its cross-cutting character calls for the application of structural measures capable of having a powerful impact on the urban environment.

Incorporating the climate variable (which includes the urban heat island effect) as well as resilience and sustainability criteria in the process is a very complex task and involves many players. What we understand by the urban development process begins with planning, continues with urban management and implementing the plan (buildings and public areas), and ends with maintaining the urban spaces. So, although projects have been promoted which, to varying degrees, include a socio-environmental perspective and even though there are many sectoral projects under way, there is still a need for a holistic, systematised and comprehensive vision.

In that regard, it is very significant that the **Metropolitan Urban Development Master Plan** (PDUM) is being drawn up at the same time as the Climate Plan, Bearing in mind that the drafting of this new urban planning framework provides a very important opportunity for introducing resilience and sustainability criteria.

Similarly, the superblock project is an opportunity for removing cars and, therefore, reducing greenhouse gas emissions while opening up more green spaces (adaptation).

PLAN ACTIONS

Actions already envisaged in the existing plans

- Barcelona Green Infrastructure and Biodiveristy Plan (2013-2020).
- "Filling the streets with life" by creating Superblocks in Barcelona (2016).
- Plan for Gender justice (2016-2020).
- Programme to Promote the City's Urban Green Infrastructure (2017).
- Barcelona Neighbourhood Plan (2016-2020).

ILLUSTRATIVE ACTION

Reclaiming 100,000 m² of public space in Eixample block interiors

The Eixample block interior map now shows 48 interiors that have been reclaimed for public enjoyment (2017). The project to reclaim these spaces began in 1987 and continues to make progress towards the target of people having a green area within 200 metres of their homes.

These re-greened spaces are local spaces that provide opportunities, fostering social cohesion (they are often linked to facilities and provide children's recreation areas), health (some are equipped with keep-fit areas for elderly people), leisure and even cooling down (some have incorporated small urban beaches). Achieving this required specific amendments to the General Metropolitan Plan.

Short-term actions (2018-2020)

6.1. **Adapt the necessary current urban planning regulations** so they help to achieve the climate change mitigation and adaptation goals and targets (2020).

6.2. **Draw up a design guide with sustainability and resilience criteria** (based on the sustainable urban planning workshops) for architects, engineers and so on, as well as key players such as research centres and universities (2020).

6.3. **Draft a green and biodiversity charter**, to provide an instrument with the technical, environmental and design criteria that need to be borne in mind when planning green spaces and urban trees, in the spirit of conserving and enhancing the city's plant and animal diversity. This charter must include the technical aspects that plans for a green space or planting roadside trees have to comply with: soil quality, soil volume, planting distances, distances between trees and lamp-posts or other urban furniture, etc. It also has to decide the choice of the most suitable species (depending on the necessary resources, which produce allergens and which avoid pests and infestations) as well as recommendations for obtaining more services (2020).

6.4. **Analyse how climate change specifically affects each district** in order to identify possible risks and vulnerabilities (heat, presence of people vulnerable to climate change, buildings in a bad state of repair, a lack of green spaces, etc.) and define what specific action is required, in collaboration with existing plans and their updated versions, such as the Neighbourhood Plan or the Barcelona Green Infrastructure and Biodiveristy Plan (2020).

6.5. **Locate and characterise the areas at risk** (of extreme heat, flooding, power cuts, availability of water, etc.) (2020).

Medium- and long-term actions (2021-2030)

6.6. **Influence higher-level planning instruments**, such as the Urban Development Master Plan (PDU) and urban planning legislation (Catalan Urban Planning Act) to incorporate planning considerations that ensure the presence of quality green infrastructure, such as green corridors, reserved spaces that allow water to infiltrate the subsoil, the protection of areas at risk from climate change or agricultural use on a metropolitan scale (2025).

6.7. **Characterise the various urban fabrics according to the risks that affect them** and establish co-relationships between them and key existing planning instruments to enable corrective measures to be incorporated when they are revised (2025).

6.8. **Keep sufficient space in the soil and subsoil to allow for the necessary climate services** (greater water infiltration, better quality soil to allow plants to grow properly, etc.) (2025).

6.9. **Rethink and adapt the criteria in project and works protocols and in the technical specifications for urban spaces**, in order to equip them with a more mainstream vision and ensure the compliance of these sustainability and resilience criteria in urban transformation projects (2025).

MUNICIPAL PLAYERS INVOLVED

- Urban Ecology.
- Barcelona Public Health Agency.
- Social Rights.
- Districts.

STRATEGIC LINES OF THE CLIMATE PLAN

Mitigation | Adaptation | Climate justice | Promoting citizen action

ASSOCIATED LINES OF ACTION:

Taking care of everyone | No cuts | Preventing excessive heat | Better than new buildings | Recovering terrace roofs | Many more green areas | Not a single drop wasted

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
- HABITABLE BCN
- HEALTHY BCN
- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS

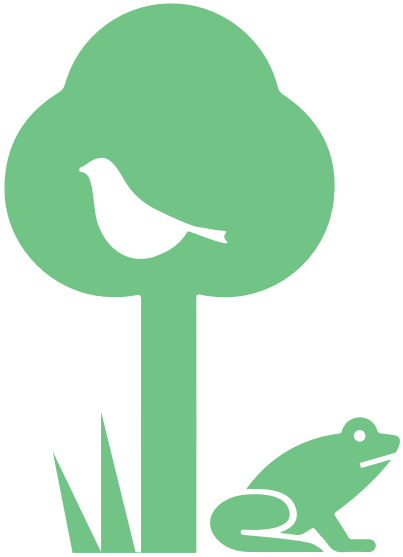
MONITORING INDICATORS

- Number of projects evaluated by means of project and works protocols.
- Soil and subsoil surface area reserved for delivering climate services.

Renewables in public areas | Getting around easily | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | **Cultural action for the climate** | Climate cooperation | Let's get organised

Line of action 7

Many more green areas



Achieving another 1.6 km² of green surface area and preserve species that are vulnerable to climate change

JUSTIFICATION AND BENEFITS

Biodiversity, which refers to the variety of life, is a key element in the functioning of ecosystems that provide many services, such as water and microclimate regulation, better air quality, food supply, etc. The measures so far adopted to preserve biodiversity are necessary but still not enough.

Climate change could have serious repercussions on the city's ecosystems and alter part of the benefits they bring, even encourage the presence of some pests (cockroaches, monk parakeets, rats and mice). So we need to analyse the best way of dealing with it to prevent its effects from becoming a threat to health or leading to a loss of diversity and ecological functionality and, therefore, lower quality of life for Barcelona's residents.

Moreover, rising temperatures and humidity variations could affect some insect populations and increase the risk of certain arboviruses (such as dengue, yellow fever, West Nile, chikungunya and Zika viruses) being transmitted. Various cases are recorded every year (there were warnings of 70 arbovirus cases in Barcelona in 2014) so supervision and control protocols have already been established.

Another obvious concern on which there is consensus is the sustained loss of biological diversity in recent decades, both in terms of populations as well as species, habitats and landscapes. Some wildlife species that live in Barcelona are particularly sensitive to climate change (amphibians, butterflies, bats, local birds, etc.) and require conservation measures.

For example, the **Barcelona's Commitment to the Climate sets a target of an additional 1.6 km² of green space by 2030**. The Programme for Promoting Urban Green Infrastructures (PIVU) spells out part of the Barcelona Green Infrastructure and Biodiveristy Plan and also specifies how to achieve those additional 1.6 km². It is also worth mentioning the Tree Master Plan (PDA), which sets out the tree selection criteria and promotes a diversity of species, adapted to the urban ecosystem and climate, and anticipates a 5% increase in tree cover by 2037.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Barcelona Green Infrastructure and Biodiveristy Plan (2013-2020).
- Eliminating the use of glyphosate in Barcelona's green spaces, streets and squares (2015).
- Programme to Promote the City's Urban Green Infrastructure (2017).
- Tree Master Plan (2017-2037).

ILLUSTRATIVE ACTION

The Parc de Joan Miró includes an area of special interest for biodiversity

This 448 m^2 area encourages the presence of wildlife by means of carefully selected nectariferous plants, which provide food for certain species of butterflies and other pollinators. Small rockeries and tree trunks also offer shelter and feeding possibilities to birds, insectivores and other beneficial species of fauna.

Almost 99% of the garden is made from organic material, while the remaining 1% is for sprinklers and footpaths, so people can walk through the garden without treading on planted areas.

Short-term actions (2018-2020)

7.1 **Incorporate climate change criteria in the Special Plan for protecting the environment and landscape of the Serra de Collserola nature reserve** (2020).

7.2 **Maintain the firefighting and prevention services**, paying special attention to areas that are more vulnerable to the risk of fire and the hillside neighbourhoods bordering woodland. Promote and supervise sustainable forest management (ongoing).

7.3 **Create design criteria and, with public participation, plan the network of urban green corridors**, a mesh connecting the green spaces with each other and with the surrounding natural areas, expressly strengthening the role that green infrastructure plays as a measure for adapting to the possible effects of climate change (2020).

7.4 **Prioritise the actions planned in the PIVU in those districts and neighbourhoods with fewer green spaces or infrastructure and those areas most exposed to heat** (2020).

7.5 **Consolidate the existing programmes to conserve wildlife vulnerable to climate change** (birds in buildings, amphibians, bats) and create new ones (for fish, such as the Catalan barbel in Collserola, and pollinators) (2020).

7.6 **Step up comprehensive pest control** (cockroaches, tiger mosquitoes, etc.) with minimum use of insecticides and biocides (2020).

7.7 **Consolidate the control programmes for arboviruses and other diseases** transmitted by insects, and also the mosquito control protocols (ASPB) (ongoing).

7.8 **Find solutions to the problem of mosquito reproduction in scuppers and reservoir roofs** (2020).

Medium- and long-term actions (2021-2030)

7.9 **Produce a catalogue of tree species** that will prioritise them according to their capacity for resisting certain extreme climate conditions (heat and little water) while providing ecosystem services (thermal regulation, shelter and food, pollutant capture, etc.), after carrying out the corresponding studies specified in the Tree Master Plan (2025).

7.10 **Decide which zones** (with high temperatures, a large exposed population, intense use of public spaces and the presence of groundwater) **need more thermoregulatory vegetation, those where it is not necessary and where xerophile vegetation** (which is adapted to dry environments and needs little water) **is already sufficient**. Priority needs to be given to native or well-adapted species in the parks, preferably evergreens, and ensuring they are incorporated into plans for public spaces, mainly near benches and rest areas (2025).

7.11 **Improve our knowledge of the effects of climate change on natural systems** (phenology, allergies, pests, etc.) (2025).

7.12 **Create ephemeral or seasonal gardens** (10 a year, one per district) (2025).

7.13 **Create a network of urban nature reserves** with a high pedagogical value designed to preserve wildlife vulnerable to climate change, among other things, and which at least includes Parc dels Tres Turons, the Montjuïc cliff and the Besòs riverbank (2030).

7.14 **Reclaim the Rec Comtal** canal (2030).

MUNICIPAL PLAYERS INVOLVED

- Urban Ecology.
- Districts.
- Barcelona Public Health Agency.

STRATEGIC LINES OF THE CLIMATE PLAN

Mitigation | Adaptation | Climate justice | Promoting citizen action

ASSOCIATED LINES OF ACTION:

Taking care of everyone | No cuts | Preventing excessive heat | Better than new buildings | Recovering terrace roofs | Planning with a climate focus | Not a single drop wasted

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
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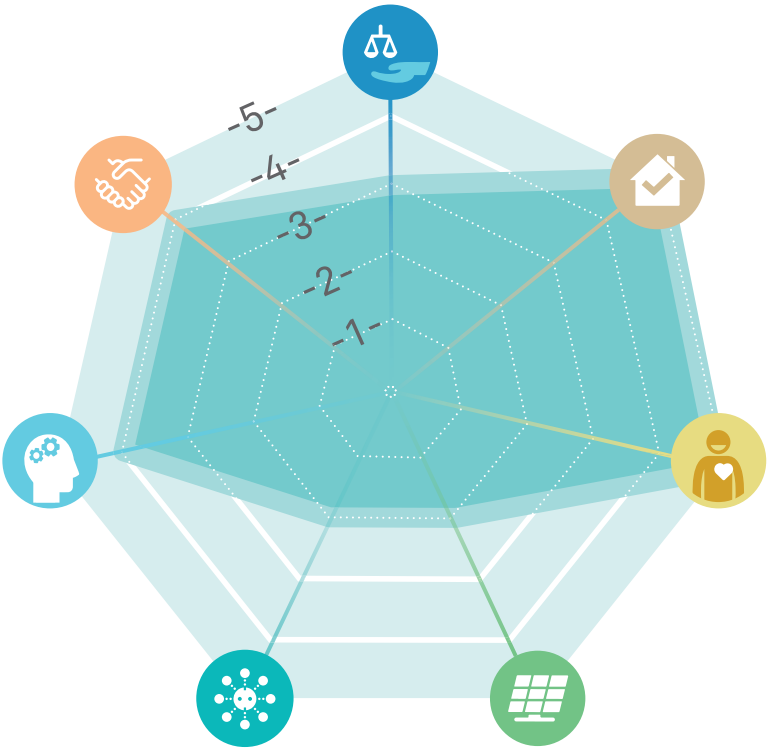
- COMMITTED BARCELONIANS



MONITORING INDICATORS

- Green surface area (total hectares and hectares per inhabitant).
- Proximity of green spaces (percentage of the population less than 5 minutes from a quality green space).
- Protected surface area (hectares of nature reserves).
- Percentage of adapted tree species.
- Number of ephemeral gardens per district.
- Number of mosquito control operations carried out.

Renewables in public areas | Getting around easily | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | Cultural action for the climate | Climate cooperation | Let's get organised

Line of action 8

Not a single drop wasted

Closing the water cycle and optimising the use of groundwater, promoting the use of rain and regenerated water and facilitating water infiltration into the subsoil

JUSTIFICATION AND BENEFITS

Barcelona suffers from recurring episodes of drought that are turning potable water into a very valuable resource and putting our capacity to maintain the city's water supply at risk. Moreover, the city has a very high degree of impermeability (72% of the municipal total).

Various climate projections appear to suggest that climate change could affect the water cycle in the following ways:

- a slight fall in resources, especially towards the end of the century.
- greater variability in the availability of water resources, in periods of drought as well as torrential rain, with the increased risk of saturating the urban drainage systems.
- a slight increase in the demand for water, which could worsen the water supply deficit that currently affects the city.

More specifically, a 12% reduction in surface resources and 9% in underground resources is forecast by 2050, along with a 4% increase in demand for different uses. There is therefore a general need for additional potable water resources in the metropolitan area of 34 hm^3 a year, with Barcelona's need estimated at 18 hm^3 a year.

Following a series of critical situations, a series of measures have been adopted to reduce potable water consumption (currently 107 litres per inhabitant per day for domestic consumption), including awareness campaigns and the construction of a desalination plant.

We also now have the Alternative Water Resources Plan (PLARHAB), which contemplates a series of actions to increase infiltration and expand the use of ground, rain, regenerated and grey water. Applying the PLARHAB means expanding the groundwater system and increasing the annual volume of the concession in order to take advantage of underground water by 2.7 hm^3 a year, from the current 1.8 hm^3 a year to 4.4 hm^3 a year.

Making the city more permeable enables us to reduce the risk of urban flooding and the impact of overflows on the receiving environment. Achieving that requires integrating water-runoff management into the city's urban model, by means of sustainable urban drainage systems (SUDS), reservoir or green roofs, or increasing the city's permeable green surface area.

Ensuring Barcelona has an optimal and efficient water cycle is one of the challenges facing the city and the metropolitan area, and one which could be posed even more starkly in the future. It is also planned to reduce domestic potable water consumption to 100 litres per inhabitant per day.

ILLUSTRATIVE ACTION

Parc de Joan Raventós, a green area that absorbs rainwater

Parc de Joan Raventós is in the Sarrià neighbourhood and has a surface area of 20,000 m^2. It opened in 2009 following the reclamation of the old Riera de les Monges riverbed. Built with an innovative, sustainable drainage system, it collects rainwater through various kinds of draining surfaces, which filter the water while purifying it, so that it eventually reaches the subsoil. In the event of a downpour, the water is kept in the retention area or anti-flooding areas created for that purpose.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Barcelona Comprehensive Sewer System Plan (2006) and updates planned.
- Barcelona Green Infrastructure and Biodiveristy Plan (2013-2020).
- Programme to Promote the City's Urban Green Infrastructure (2017).
- Tree Master Plan (2017-2037).
- Drought Protocol (2017).
- Technical Plan for Taking Advantage of Alternative Water Resources (2018) and updates.

Short-term actions (2018-2020)

8.1 **Foster water saving on a municipal level** in irrigating parks and gardens, fountains, street cleaning and municipal buildings (ongoing).

8.2 **Incorporate up-to-date climate projections in future editions of the Drought Protocol** (2018).

8.3 **Increase soil permeability by defining a sustainable urban drainage strategy for Barcelona** that offers design recommendations in a manual, maintenance protocols (with professional training to ensure it is done correctly) and recommendations on how to monitor and evaluate its effectiveness using monitors and sensors (2020).

8.4 **Use drainage paving** by means of innovative public procurement (2020).

8.5 **Run publicity campaigns to encourage water-saving on a domestic level** and, in 2018, link that to the Water Memorial celebrations (ongoing).

8.6 **Envisage watering trees and increasing that whenever necessary for the desired evapotranspiration and cooling services** (optimally by remote control, depending on the water balance) (2020).

8.7 **Ensure compliance with the protocol for emptying water into naturalised ponds** in the event of a drought, to preserve and protect amphibians and water plants (ongoing).

8.8 **Assess and continually monitor the quality of drinking water and groundwater** to see it is affected in periods of drought or heavy rain (2020).

8.9 **Have a Barcelona water supply plan in place** (2020)

Medium- and long-term actions (2021-2030)

8.10. **Draw up a base map of the city's subsoil** to find out the present degree of occupancy and impermeability and create reserve spaces for infiltration (2025).

8.11. **Promote the use of grey water** in new housing developments and renovations or for industrial purposes, and study its inclusion in future versions of the Municipal Urban Environment By-law (2025).

8.12. **Study the energy impact of supplying water** (the desalination plant, regenerated water plants, etc. (2025).

8.13. **Study the feasibility of producing regenerated water at the Besòs waste water treatment plant (EDAR)** to feed the Besòs aquifer, to maintain the river's ecological flows and feed the purification plant (2025).

8.14. **Exploit the Besòs aquifer resource** as potable water and build a purification plant (2030).

8.15. **Utilise regenerated water from the River Llobregat for the industrial uses** of the Zona Franca Consortium and for recharging the aquifer (2030).

8.16. **Build recharging pools** at high points in the city and generate a flow retention and lamination effect, and install rainwater capture systems in Collserola so it can be reused. Evaluate their exploitation cost (2030).

8.17. **Utilise pumped groundwater** from underground facilities (the metro, car parks) to infiltrate the aquifer (2030).

8.18. **Prevent saline intrusion** by using regenerated water and surplus groundwater (2030).

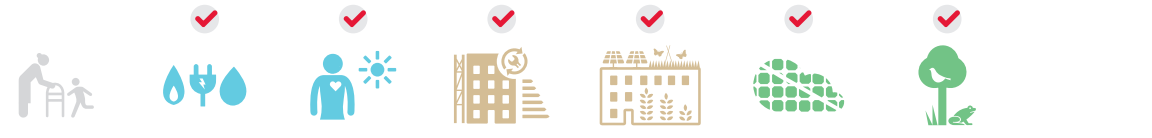
MUNICIPAL PLAYERS INVOLVED

- Urban Ecology (BACSA).
- Districts.
- Barcelona Metropolitan Area.
- Catalan Water Agency.
- Barcelona Public Health Agency.

STRATEGIC LINES OF THE CLIMATE PLAN

Mitigation | **Adaptation** | **Climate justice** | Promoting citizen action

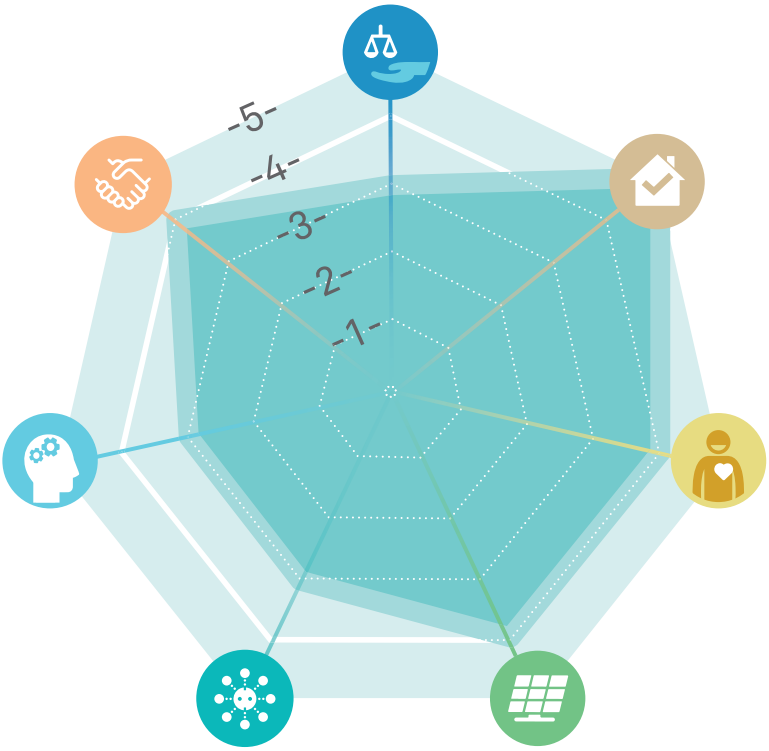
ASSOCIATED LINES OF ACTION:



Taking care of everyone | No cuts | Preventing excessive heat | Better than new buildings | Recovering terrace roofs | Planning with a climate focus | Many more green areas | Not a single drop wasted

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
- HABITABLE BCN
- HEALTHY BCN
- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS



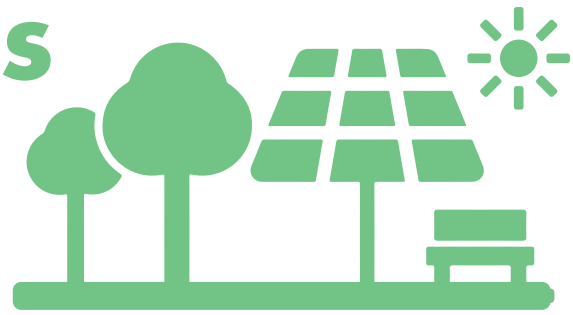
MONITORING INDICATORS

- Water consumption by type and use (cubic metres).
- Length of groundwater system built (kilometres).
- Number of buildings renovated or built reusing grey water.
- Number of projects incorporating SUDS.
- Percentage of permeable surface area in the city.

Renewables in public areas | Getting around easily | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | Cultural action for the climate | Climate cooperation | Let's get organised

Line of action 9

Renewables in public areas



Fostering the installation of solar power generating systems in public areas by means of new structures or transforming existing urban structures

JUSTIFICATION AND BENEFITS

Barcelona is committed to a change of energy model in the short-to-medium term by switching mainly to clean and renewable energy sources. This restructuring has to be linked to a significant change in power generation and consumption patterns by promoting, among other things, the development of systems for generating solar power, the most abundant renewable energy resource we have.

The City Council is therefore pushing for generating systems to be installed in buildings, facilities and public spaces that make use of available, local, waste or renewable resources, principally the sun, to reduce the amount of energy that comes from the grid.

This has included the launch of a solar power generation promotion programme in Barcelona to boost the installation of solar power systems on buildings and in existing public spaces, whether they are publicly or privately owned, by means of public or private investment.

One example of how to take advantage of public spaces and their structures to generate power is the installation of power-generating pergolas and converting existing pergolas into power generators

There were 15 power-generating pergolas spread across the city in 2016 and the intention is to continue installing them.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Programme to Promote Solar Power Generation in Barcelona (2017-2019) and subsequent editions (2019-2030).

ILLUSTRATIVE ACTION

Photovoltaic pergola over a children's play area in Barcelona's Plaça del Centre

When Plaça del Centre, a square in the Les Corts district, was renovated, a pergola was placed over the children's play area which, as well as providing shade, uses solar power to generate electricity.

The pergola is covered with photovoltaic panels with 12.48 kWp of installed power. It is connected to a set of lithium-ion batteries and supplies locally sourced renewable energy to the 25 public lights in the square itself and on the stretch of Avinguda de Madrid that crosses it. In fact it supplies 70% of the square's annual lighting needs. When the energy stored in the batteries proves insufficient, the lights are powered directly from the electricity grid.

Short-term actions (2018-2020)

9.1. **Set up a municipal energy marketing company** at the service of everyone (2018).

9.2. **Deploy the municipal energy operator** which will drive renewable energy production in the city and facilitate its installation in public and private spaces (2020).

9.3. **Facilitate the integration of power generation structures** into public spaces by adapting the existing regulatory framework (2020).

Medium- and long-term actions (2021-2030)

9.4. **Create programmes to foster employment around local and renewable power generation** (ongoing).

9.5. **Evaluate incorporating this generation in other parts of the public space**, such as pavements, road surfaces, etc. (2025).

MUNICIPAL PLAYERS INVOLVED

- Urban Ecology.
- Enterprise, Culture and Innovation.
- Districts.
- Administration and Economy.

STRATEGIC LINES OF THE CLIMATE PLAN

Mitigation **Adaptation** Climate justice Promoting citizen action

ASSOCIATED LINES OF ACTION:

Taking care of everyone · No cuts · Preventing excessive heat · Better than new buildings · Recovering terrace roofs · Planning with a climate focus · Many more green areas · Not a single drop wasted

VALUES OF THE CLIMATE PLAN

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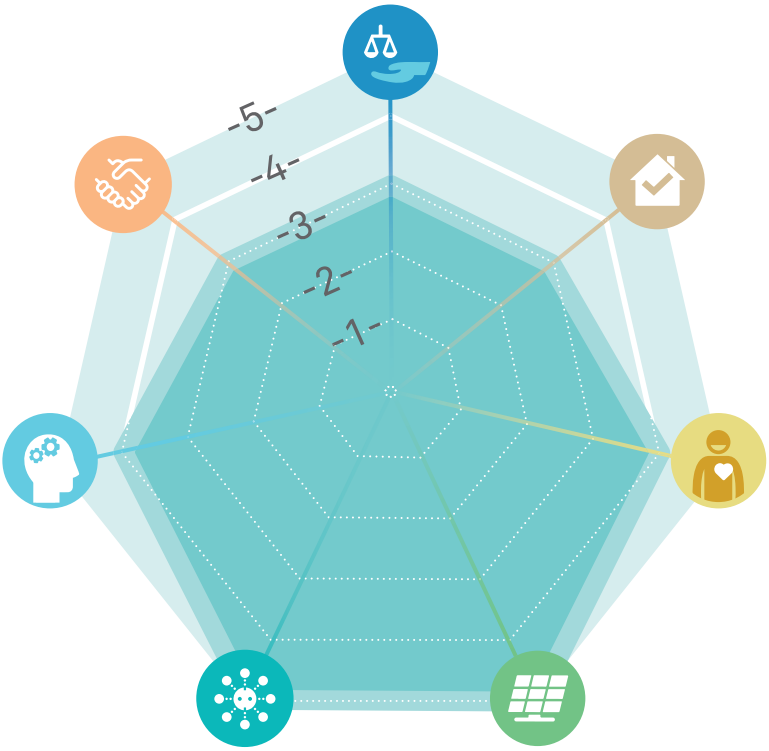

MONITORING INDICATORS

- Installed generating power.

Getting around easily | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | **Cultural action for the climate** | Climate cooperation | **Let's get organised**

Line of action 10

Getting around easily

Optimising the urban network to encourage a change of city model that produces more spaces for pedestrians and fewer for private motor vehicles

JUSTIFICATION AND BENEFITS

Mobility is a key factor in urban development. The public's everyday life cannot be understood without considering the millions of journeys made on foot, by bike, on public transport and in private vehicles, not to mention commercial vehicles. However, that transport and those vehicles now account for 30% of the city's greenhouse gas emissions. So this is one of the main sectors where action is required.

Reducing the number of vehicles, while making sure those on the roads are cleaner, and facilitating the switch to more efficient means of transport, by promoting public transport, cycling and going on foot, are two essential lines of action for tackling climate change and improving the city's environmental quality.

Another priority is promoting a model change by replacing private vehicles with more sustainable forms of mobility for reasons of health. So work is being done to offer other ways of getting round the city, principally public transport but also other shared-vehicle options. The idea is to have a broad range of mobility options in place that meets the needs of every journey and is more efficient.

Removing cars from the streets also means reclaiming public space to bring life back to the streets, create more green spaces, improve rainwater drainage, make more space available to pedestrians and so on.

So we need to rethink how to plan and transform the city in a way that gives more prominence to pedestrians and cyclists, boosts the use of collective public transport by improving existing infrastructures, reduces the use of private vehicles and, in general, ensures that mobility in the city is geared towards improving the quality of life of its citizens. For example, the superblock programme is an opportunity to remove cars from the city and reclaim space for the general public to use.

Improving mobility also requires coordination with the higher-level authorities to ensure the city's transport infrastructure plans are implemented and our goals can be achieved.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Urban Mobility Plan (2013-2018) and subsequent updates.
- Bicycle Strategy (2015).
- Barcelona Air Quality Improvement Plan (2015-2018).
- Programme of anti-air pollution measures (2016).
- "Filling the streets with life" by creating Superblocks in Barcelona (2016).
- Developing electric vehicles in Barcelona (2018).

ILLUSTRATIVE ACTION

Expanding the cycling infrastructure, as one of the main goals for implementing the measures set out in the 2013-2018 Urban Mobility Plan.

Barcelona City Council aims to provide 308 km of cycle lanes by 2019, which would mean an increase of 165% on the figure quoted in the 2015 Strategic Bicycle Measure (based on a network of 116 kilometres). This would ensure that at least 95% of the city's population would have a bike lane 300 m from their home.

With this target in mind, nearly 130 interventions are planned in various streets and locations in order to achieve the full roll-out of the cycle lane network. In most cases, new cycle lanes will be created, although in some places, streets will be improved or signs and markings will be introduced for cycling (30 kph zones) and cycle routes.

Short-term actions (2018-2020)

10.1 **Improve public transport accessibility and frequency** (ongoing).

10.2 **Promote cycling**: develop infrastructure (cycle lane network), encourage different forms of cycling (own/shared bike, mechanical or electric) (ongoing).

10.3 **Improve modal interchanges between bikes and public transport** (ongoing).

10.4 **Provide grants and subsidies for going to work by bike**: Promote a pilot test, help businesses to buy bikes and evaluate the possibility of economically compensating workers for the kilometres travelled to work (annually).

10.5 **Electrify and diversify municipal vehicle fleets** (ongoing).

10.6 **Promote plug-in electric or hybrid motorbikes** (ongoing).

10.7 **Promote electric and mechanical bike fleets** (ongoing).

10.8 **Strengthen and create new infrastructure linked with electric vehicle penetration** in the city: increase the number of charging points in municipal car parks, pilot tests for charging points for urban goods distribution, taxis, etc. (ongoing).

10.9 **Regulate parking and budget to oversee the promotion of electric vehicles in the city** (ongoing).

10.10 **Introduce and consolidate services associated with promoting electric vehicles**: electric taxis, sharing the last mile with an electric vehicle, etc. (ongoing).

10.11 **Make the low emission zone permanent** (ongoing)

10.12 **Improve goods distribution** and promote last mile distribution by bike, electric motorbike, etc., through microplatforms (ongoing).

10.13 **Consolidate the Poblenou superblock, create new ones** in the city (Horta - old quarter, Eixample - Sant Antoni, Sants-Hostafrancs, Les Corts - La Maternitat i Sant Ramón) and study others (2020).

10.14 **Implement the Barcelona City Council Mobility Plan** (2020).

Medium- and long-term actions (2021-2030)

10.15 **Urge companies to draw up sustainable mobility plans** (2025).

10.16 **Diversify fuels and electric vehicles in vehicle fleets** (2025).

10.17 **Promote a 100% low-emission taxi fleet**. In accordance with the measure adopted by the metropolitan area (AMB), from 2019 no taxi licences will be awarded to diesel vehicles (2025).

10.18 **Link up the tram systems** (2025).

10.19 **Renew the bus and coach fleet with less polluting technologies**, and give priority to zero-emission vehicles. In line with the C40 - Fossil Fuel Free Cities agreement, only electric buses will be purchased from 2025 on (2025). A fossil fuel free zone also needs to be set up in line with the C40 commitment (2030).

10.20 **Create park & ride zones in collaboration with other authorities** (2030).

10.21 **Extend the superblock concept to the whole city** (2030).

10.22 Increase the number of bus lanes in the city and **complete the roll-out of the orthogonal bus network** (2030).

MUNICIPAL PLAYERS INVOLVED

- Urban Ecology.
- Districts.
- TMB.

STRATEGIC LINES OF THE CLIMATE PLAN

Mitigation **Adaptation** **Climate justice** Promoting citizen action

ASSOCIATED LINES OF ACTION:

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VALUES OF THE CLIMATE PLAN

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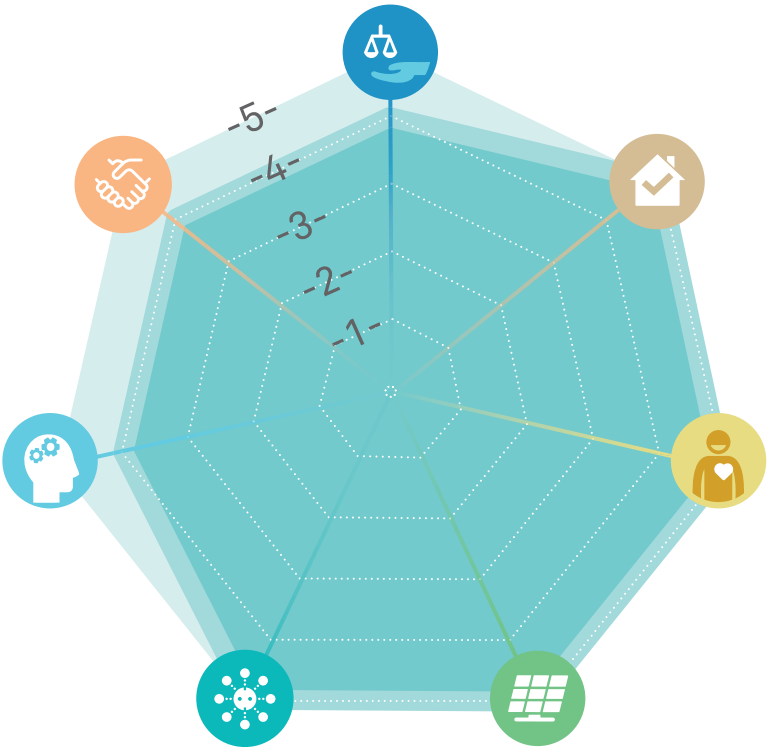


MONITORING INDICATORS

- Kilometres of bike lanes installed.
- Number of superblocks installed.
- NO_x and PM_{10} emissions (micrograms / cubic metre).
- Number of electric-car charging points.
- Energy consumption of the municipal vehicle fleet, by type of fuel.
- Number of park & ride zones created.

Renewables in public areas | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | Cultural action for the climate | Climate cooperation | Let's get organised

Line of action 11

Conserving the seafront

Maintaining and making the most of the environmental services offered by the sea and the coastline to combat climate change. Ensuring the functional integrity of the coastline.

JUSTIFICATION AND BENEFITS

Barcelona's history has been bound up with the sea since its origins. The coastline has been gradually transformed over the years, and a landscape of lagoons and mud flats has been heavily developed by human hand, predominantly industrial facilities in the 19th century, into the urban seafront we have today.

Opening Barcelona up to the sea has undoubtedly been one of the big challenges and achievements of municipal politics in the last 40 years. As a result of this process, with its beaches and coastal parks, the city now has more than 133 ha of free space, and one of the biggest public spaces in the city. Because, as a look at the old maps shows, those beaches are beyond the "natural" lie of the coastline.

The seas and oceans play a key role in climate change mitigation. More than a quarter of the CO_2 released into the atmosphere is captured and stored at the bottom of our oceans by means of certain physical, chemical and biological processes. However, the increase in emissions and excess of greenhouse gases in the atmosphere could prevent this system from working as it should and, ultimately, reduce its mitigating potential.

On the other hand, the Barcelona shoreline provides some key environmental services: it protects the infrastructure and neighbourhoods behind the beaches, provides food, is used for leisure and so on. Moreover, there are services that have to be used in tackling the adverse effects that climate change might produce. Then beaches and coastal parks, for example, could be a place to shelter during heat waves, given they have the lowest daytime temperature in the city and there is the sea to cool down in.

But if we are to take advantage of the environmental services the shoreline offers, we need to take care of it. That requires keeping the mass of sea water fit for bathing in and maintaining the marine ecosystems in optimum conditions, because the life cycle of the sea, for example, also helps atmospheric carbon, or blue carbon, capture. Consequently, there is not only a need to adapt the sanitation system, it is also essential to publicise and make people aware of the vulnerability of the marine ecosystem and the action that can be taken to keep it in good condition.

Ensuring the environmental functionality of the city coastline requires making sure the beaches have sediment in sufficient quantity. That means guaranteeing its sedimentary balance by adopting the appropriate measures and increasing its resilience.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Comprehensive Coastline Management Plan (PGIL) (2007).
- Strategic Pan for the City's Coastal Areas (2018-2025).
- Port Olímpic Master Plan (2018).

ILLUSTRATIVE ACTION

Transferring sand from the Olympic Port entrance to Barcelona's beaches, as part of the PGIL, a collaborative tool of the competent authorities

The Comprehensive Coastline Management Plan (PGIL) is Barcelona City Council's tool for deciding how the city's beaches are managed, and establishes a joint working framework for all the agents involved. This plan is covered by Article 6.3 of Act 1/2006, of 13 March, and is based on an agreement between the Catalan and Spanish governments and Barcelona City Council, signed in 2007, that provides a framework for institutional collaboration.

Transferring the sand trapped by the Maresme marina port structures to the beaches to the west complies with the demands of Spain's environment ministry and the Catalan government.

Similarly, on the Barcelona coastline and under the PGIL, the sand deposited at the Olympic Port entrance is dredged every year and transferred to the Somorrostro and Barceloneta beaches (currently about 8,000 m^3 a year). It would be necessary to study the feasibility of making the dredging and transfer of sand more effective to see if it would be possible to feed other city beaches, besides increasing the effectiveness of the feeding operation to maximise conservation of the sand transported.

Short-term actions (2018-2020)

11.1 **Analyse the social perception of the effects of climate change on the coast** (expanding the beach user survey) with the aim of prioritising and redesigning the beach awareness and communication actions (2018).

11.2 **Carry out further studies on the vulnerability of beaches to erosion and sea flooding** (2019).

11.3 **Define the strategy for protecting and the specific use of each beach** in line with the study results (2020).

11.4 **Establish sediment conservation measures**: beach regeneration, change the grain size of the sediment brought in, analyse other coast protection options (2020).

11.5 **Redefine existing coastal uses** to adapt them to future uses and to beach availability, and introduce sustainability into all the activities that take place there (2020).

11.6 **Naturalise the Barcelona** coast so the land spaces can eventually become a green corridor and the coastal sea might improve its physical, chemical and biological quality and its biodiversity (2020).

11.7 **Promote sustainable use of the sea** by fostering environmentally friendly marine activities through the coastal sea schools, publicise Barcelona's reef park, etc. (2020).

11.8 **Increase public knowledge of the sea**, promote its heritage value and popular science (the CSIC's public area of experimental research, the Beach Centre's educational programme, etc.) (2020).

Medium- and long-term actions (2021-2030)

11.9 **Apply adaptation and resilience increasing measures that are suited to the Barcelona coast** (2030).

11.10 **Increase marine biodiversity** by installing artificial reefs (2030).

11.11 **Study the effects of climate change on the sea temperature** and their implications for water quality, marine biodiversity, fishing and so on (2030).

11.12 **Reduce discharges into the receiving environment during periods of heavy rain and ensure that any water discharged into the natural environment is of sufficient quality** (2030).

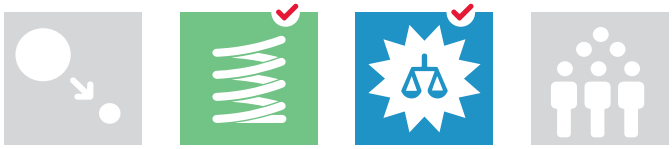
11.13 **Foster the protection and expansion of the current marine carbon sinks** (mainly the Garraf and Maresme meadow woods) between the towns on the Barcelona coast, and encourage collaborative networking (2030).

11.14 **Re-plan the model for coastal area uses** that is consistent with a continuous improvement policy for environmental practices and preventing coastal pollution, with the ultimate aim of maintaining the quality, biodiversity, productivity and dynamism of our sea (2030).

MUNICIPAL PLAYERS INVOLVED

- Municipal Manager's Office.
- Urban Ecology.
- Districts.
- Coastal research centres.
- Citizen organisations.
- Others.

STRATEGIC LINES OF THE CLIMATE PLAN



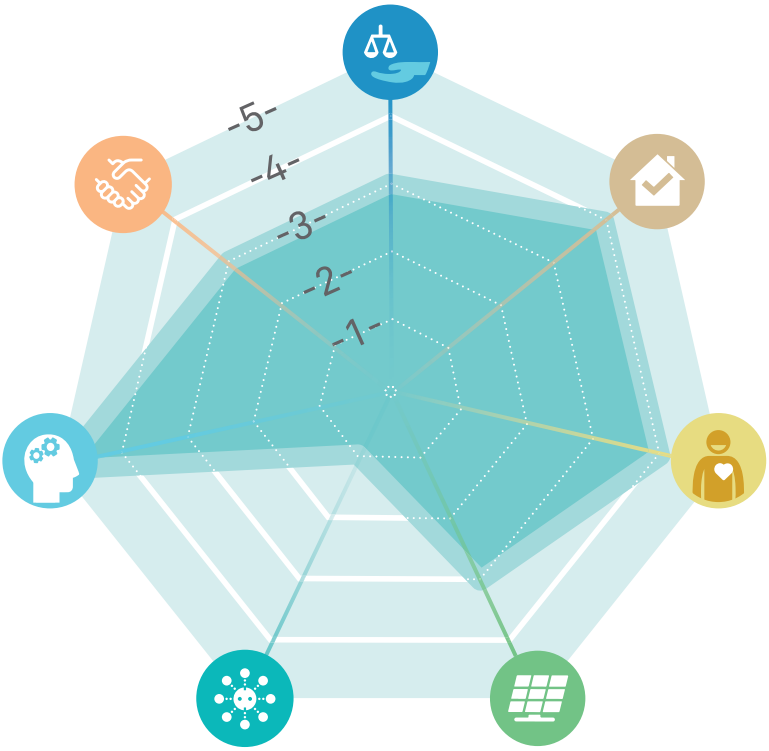
Mitigation | **Adaptation** | **Climate justice** | Promoting citizen action

ASSOCIATED LINES OF ACTION:

Taking care of everyone | No cuts | **Preventing excessive heat** | Better than new buildings | Recovering terrace roofs | **Planning with a climate focus** | **Many more green areas** | **Not a single drop wasted**

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
- HABITABLE BCN
- HEALTHY BCN
- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS



MONITORING INDICATORS

- Breadth of emerged beach (metres).
- Total beach volume (cubic metres).
- Percentage of occupied / free beach space.
- Quality indices for coastal water, river water and biodiversity.
- Number of activities carried out by the sea schools to foster sustainable use of the sea.
- Number people attending popular-science and citizen-science centres promoting knowledge of the sea.

Renewables in public areas | Getting around easily | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | **Cultural action for the climate** | Climate cooperation | Let's get organised

The Climate Plan asserts the need to rethink the current economic model, decarbonise the economy and modify consumption patterns. We have to promote an economy that closes cycles, fosters the efficient use of resources, responsible consumption, waste prevention and its subsequent recycling and reuse, and which leads to food sovereignty.

This results in processes and products that emit fewer greenhouse gases, and citizens who adapt their consumption habits to fit a more conscious and responsible model. Boosting local business innovation and competitiveness is key to creating employment, especially for the most vulnerable population. At the same time, we need to move towards a model that fosters the social and solidarity economy, prioritises satisfying people's needs over profit, based on fairness, solidarity, sustainability, participation, inclusion and community commitment, values which also drive social change.

What this means is a radical transition to a new social and economic model that has to be determined and fair, and which we need to accelerate.

Climate economy

12. Virtuous circle

13. Responsible consumption

14. Zero Waste

15. Food sovereignty

GOALS AND TARGETS FOR 2030

Obtain 100% clean funding.

Pursue the zero waste strategy.

- Achieve 1.2 kg waste/inhab/day.
- Achieve 60% selective collection (of all waste generated) and quality organic waste collection, with a maximum of 8% foreign matter in weight.
- >130,000 t of CO_2 saved per year.
- >4,500 jobs with full roll-out of the Zero Waste strategy.

Reach 10% of GDP generated by the social and solidarity economy

Triple the fresh vegetables consumed in the city that come from Barcelona province

1 farmers' market per district

Presence of local produce in all municipal markets

0 single-use, non-compostable tableware at public events and in public buildings

Incorporate social and environmental criteria in 80% of public procurement

Line of action 12

Virtuous circle

Drawing up a green and circular economy strategy

JUSTIFICATION AND BENEFITS

Barcelona aspires to be a city that uses its own resources effectively and one which substantially reduces its impact on other areas, to enable local developments with the capacity for boosting employment, strengthening social cohesion and improving everyone's quality of life.

Boosting the circular economy helps the transition to a more efficient use of resources and low emissions, which should allow us to fight against climate change and the impact it has. Boosting local business innovation and competitiveness is key to creating employment, especially for the most vulnerable population, and strengthening the social and solidarity economy at the same time.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Plan for Promoting the Social and Solidarity Economy (2016-2019) and subsequent updates.

ILLUSTRATIVE ACTION

New municipal policy on the relationship with financial institutions, incorporating social and environmental clauses and criteria

The City Council, in its public leadership role, intends to foster a more plural economy and incorporate new financial entities, new banking services and new financing offers that include social and environmental values into municipal management. Traditional banking covered approximately 92% of municipal financing needs until 2016. But 28% of Barcelona City Council's 2017 financial transactions correspond to the issue of green and sustainable bonds; 32% to public banking; 18% to ethical banking, and only 22% to traditional banking.

This means we are opening up to banking institutions that are committed to the Climate Plan's principles.

Short-term actions (2018-2020)

12.1 **Draft a government measure on the green and circular economy** (2019).

12.2 **Foster low-carbon public procurement** by drawing up guidelines and carrying out innovative public procurement (2020).

12.3 **Set up programmes for training and employment in the circular economy** through Barcelona Activa (2020).

Medium- and long-term actions (2021-2030)

12.4 **Design a municipal strategy for the green and circular economy** (2025).

12.5 **Adapt Barcelona Activa to promote the green local economy** (2025).

12.6 **Set up programmes to foster green employment, self-employment, and eco-entrepreneurship** in economic sectors linked to climate change (energy renovation, solar panel installation and maintenance, drainage system maintenance, new gardening, etc.) (2025).

12.7 Review dealings with financial institutions to **incorporate and promote ethical banking and entities involved in the cooperative, social and solidarity economy** (ECSS) (2025).

12.8 **Consolidate sustainable-bond issues** to attract international and local capital for sustainable projects in the city (2025).

12.9 **Develop a mechanism to compensate for emissions generated by major public works in the city**, in support of actions to combat climate change (2025).

12.10 **Study the options for improving environmental taxation** for "low-carbon" companies (2030).

12.11 **Advise companies on reducing waste and emissions**, both at the planning stage and when implementing improvements (2030).

12.12 **Facilitate the replacement of machinery and professional vehicles with others that are low in emissions**(2030).

12.13 **Improve energy consumption efficiency in businesses, especially in shops and services**(2030).

12.14 **Encourage companies and other entities to produce and consume their own energy from renewable sources** (2030).

12.15 **Promote the consumption of waste-valorisation products and supplies** (2030).

12.16 **Study the feasibility of having a green aaccounting system at City Hall** for classifying green-economy actions in the municipal budgets, as well as creating an additional environmental classification (2030).

MUNICIPAL PLAYERS INVOLVED

- Urban Ecology.
- Social Rights.
- Districts.
- Commissioner for Cooperative, Social and Solidarity Economy
- Administration and Economy.

STRATEGIC LINES OF THE CLIMATE PLAN

Mitigation

Adaptation

Climate justice

Promoting citizen action

ASSOCIATED LINES OF ACTION:

Taking care of everyone

No cuts

Preventing excessive heat

Better than new buildings

Recovering terrace roofs

Planning with a climate focus

Many more green areas

Not a single drop wasted

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
- HABITABLE BCN
- HEALTHY BCN
- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS

MONITORING INDICATORS

- Number of employed persons, salaried and freelancers, and the number of companies linked to the green, social and circular economy.
- Installed solar generating power.
- Energy intensity.
- Percentage of clean funding.
- Number of contracts low in carbon.

Renewables in public areas

Getting around easily

Conserving the seafront

Responsible consumption

Zero Waste

Food sovereignty

Cultural action for the climate

Climate cooperation

Let's get organised

Line of action 13

Responsible consumption

Promoting conscious consumption that drives healthier, more sustainable ways of life, facilitating the choice of and access to sustainable and socially just products and services

JUSTIFICATION AND BENEFITS

Consumption affects and determines many essential aspects of life (food, housing, clothes, basic utility supplies, leisure, transport, etc.), so the production and consumption model has profound social, economic, environmental and ethical implications for the city itself as well as beyond its boundaries, since services and products are often made in other places. Consumption therefore has a direct effect on GHG emissions because, for example, it is not the same buying local food products as those produced thousands of kilometres away, or replacing an old domestic electrical appliance with a new and efficient one, etc.

Promoting responsible consumption, in a holistic, collective responsibility sense, fostering habits and lifestyles directed towards the supply and demand of sustainable, socially just products and services and tending towards a model that fosters the social and solidarity economy (which prioritises satisfying people's needs over profit, based on fairness, solidarity, sustainability, participation, inclusion and community commitment, values that also promote social change) are key aspects in minimising the social and environmental impacts of our society.

Public awareness of responsible consumption in Barcelona is on the increase but we need to define strategies and adopt measures that facilitate access to those products, habits and lifestyles, as well as take action that helps the economic agents in the transition to responsible consumption, with a more sustainable market that is also accessible and affordable for the most vulnerable population.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Barcelona Municipal Waste Prevention Plan (2012-2020).
- Barcelona Zero Waste Strategy (2016-2020).
- Strategy for Promoting Responsible Consumption (2016-2019) and subsequent updates.
- Plan for Promoting the Social and Solidarity Economy (2016-2019) and subsequent updates.
- Food Policy Promotion Strategy (2016-2019) and subsequent updates.

ILLUSTRATIVE ACTION

The Responsible Consumption, Social and Solidarity Economy Fair offers an alternative with local, sustainable, socially just products for Christmas

In 2016, Barcelona City Council began organising a Christmas fair on the busiest shopping days of the festive season. The fair invites social and solidarity economy organisations and companies to exhibit, sell and advertise their products and services in order to involve the general public in responsible consumption and buying local produce. Around 60 projects and entities take part, offering a wide range of products and services spanning, among others, food, clothes, knowledge and culture, communication, ethical financing, care and health.

Apart from these ideas for responsible consumption, there are cultural activities to attract the general public to a market whose main aim is not to make a profit but to improve the quality of life of as many people as possible. Another aim of this alternative fair is to avoid the compulsive, unthinking consumption typical of Christmas time.

Short-term actions (2018-2020)

13.1. **Create a new benchmark space (Espai Consum)** in the city **that will promote responsible consumption**, provide information and specific resources for facilitating responsible consumption and become a meeting point for the stakeholders in consumption (2018).

13.2. Encourage a new way to be more socially and environmentally friendly by **setting up the FAR (lighthouse) for social and economic innovation**, a facility for promoting the social and solidarity economy and ESS advice points in the districts, with more training and a line of funding for business projects based on agreements with ethical banks, among other things (2018).

13.3. **Expand and strengthen the Network of Municipalities for the Social and Solidarity Economy**, which promotes new democratic, solidarity and sustainable ways of producing and consuming, with the aim of moving towards an economic model that is more resistant to the effects of major economic crises (2018).

13.4. Boost the promotion of citizen and social projects and initiatives and **continue the specific line of subsidies for responsible consumption** (ongoing).

13.5. **Enrich the Municipal Consumer Information Office (OMIC) with a responsible consumption perspective** and expand the information and advice resources with specific issues resulting from a new way of doing things, such as the platform economy or the collaborative economy (2019).

13.6. Identify and **highlight local authority strategies and good practices for responsible consumption** by boosting its illustrative role in public policies (2019).

13.7. **Conduct specific internal training on responsible consumption** at City Hall (2020).

13.8. **Consolidate the Social and Solidarity Economy Fair and the Christmas Responsible Consumption Fair** as meeting points and places for promoting economic initiatives that advocate social and environmental justice (ongoing).

13.9. **Apply and increase the use of social and environmental purchasing criteria in public procurement** (ongoing).

Medium- and long-term actions (2021-2030)

13.10. **Foster economic models based on responsible consumption** and on social and solidarity economy organisational models (2021).

13.11. **Raise public awareness of the responsibility of choice in consumption** (2025).

13.12. **Strengthen the greening of public and public-private events** in relation to using single-use glasses and bottled water (2030).

MUNICIPAL PLAYERS INVOLVED

- Urban Ecology.
- Social Rights.
- Districts.
- Commissioner for Cooperative, Social and Solidarity Economy
- Administration and Economy.

STRATEGIC LINES OF THE CLIMATE PLAN

Mitigation **Adaptation** **Climate justice** **Promoting citizen action**

ASSOCIATED LINES OF ACTION:

Taking care of everyone | No cuts | Preventing excessive heat | Better than new buildings | Recovering terrace roofs | Planning with a climate focus | Many more green areas | Not a single drop wasted

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
- HABITABLE BCN
- HEALTHY BCN
- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS

MONITORING INDICATORS

- Number of FAR, ESS advice point and Espai Consum users.
- Number of tips given on responsible consumption.
- Number of greened events.
- Number of users and economic activity at the Christmas Responsible Consumption Fair.
- Result of responsible consumption subsidies awarded.

Renewables in public areas

Getting around easily

Conserving the seafront

Virtuous circle

Zero Waste

Food sovereignty

Cultural action for the climate

Climate cooperation

Let's get organised

Line of action 14

Zero Waste

Rolling out the zero waste strategy by means of the waste action plan, in order to substantially reduce the generation of waste, improve separate collection and promote its reuse as resources

JUSTIFICATION AND BENEFITS

The best waste is waste that is not created.

At present, waste treatment and management account for approximately 10% of computable greenhouse gas emissions in the city. Reducing waste, separating it out and managing it correctly is therefore key in reducing its impact.

Prioritising measures for prevention, reduction, repair and reuse is the first step in seeking to achieve zero waste. Correct management of waste generated and its possible reuse are end strategies which, while necessary, consume energy and generate emissions. Therefore, the less waste, the better.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Barcelona Municipal Waste Prevention Plan (2012-2020)
- Barcelona Zero Waste Strategy (2016-2020)
- Strategy for Promoting Responsible Consumption (2016-2019) and subsequent updates.
- Plan for Promoting the Social and Solidarity Economy (2016-2019) and subsequent updates.
- Food Policy Promotion Strategy (2016-2019) and subsequent updates

ILLUSTRATIVE ACTION

Repair workshops

Barcelona City Council has a repair workshop programme for civic and neighbourhood centres, that is designed to provide people with the knowledge they need to repair their own electronic devices and small household electrical appliances.

The Plan's main aims are to:

- **Promote waste prevention.**
- **Preserve raw materials** and avoid exhausting their supply on making new appliances.
- **Avoid generating new waste** and, therefore, the economic and environmental costs associated with its subsequent treatment.
- **Give people the tools** for lengthening the useful life of appliances.

Short-term actions (2018-2020)

14.1. **Foster exchange and marketing of second-hand products** (ongoing).

14.2. **Develop more product repair and restoration services** and empower people so they can repair their own things (e.g. the Barcelona City Council and AMB repair workshop programmes) (ongoing).

14.3. **Promote deposit, return and refund systems** (SDDR) in the city (ongoing)

14.4. **Introduce and promote the use of a reusable tableware loan service** for public events (2018).

14.5. **Promote fab labs 2.0 (*ateneus de fabricació*)** (2018).

14.6. **Promote waste reduction, management and reuse initiatives at events, trade fairs and conferences** (the Donation Room, for example) (2020).

14.7. **Optimise transport routes** to reduce journeys and improve the **waste collection service** (2020).

Medium- and long-term actions (2021-2030)

14.8. **Renew the cleaning and waste collection fleet with less polluting vehicles** on the market (2025).

14.9. **Promote waste prevention in shops and department stores** (2025).

14.10. **Extend the door-to-door system where it is practical** (2030).

14.11. **Foster and promote products and commercial formats that reduce or do away with packaging and the waste associated with packing** and transporting products (2030).

MUNICIPAL PLAYERS INVOLVED

- Urban Ecology.
- Districts.
- Commissioner for Cooperative, Social and Solidarity Economy
- Enterprise, Culture and Innovation.
- Administration and Economy

STRATEGIC LINES OF THE CLIMATE PLAN

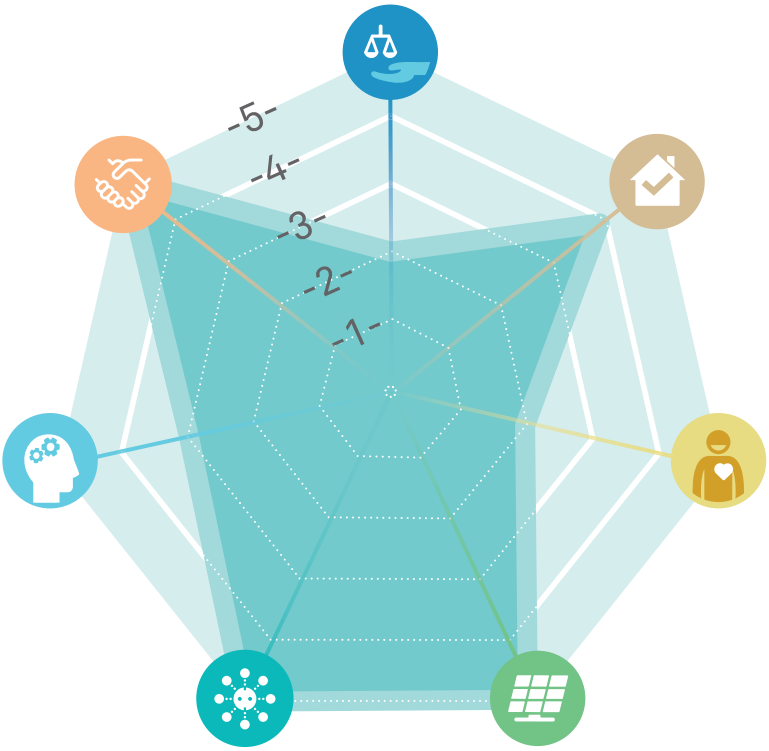
Mitigation **Adaptation** **Climate justice** **Promoting citizen action**

ASSOCIATED LINES OF ACTION:

Taking care of everyone | No cuts | Preventing excessive heat | Better than new buildings | Recovering terrace roofs | Planning with a climate focus | Many more green areas | Not a single drop wasted

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
- HABITABLE BCN
- HEALTHY BCN
- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS



MONITORING INDICATORS

- Kilograms of waste avoided.
- Kilograms of waste reused.
- Percentage of economic waste devoted to repairing, upcycling or recycling with added value, and exchanging products.

Renewables in public areas
Getting around easily
Conserving the seafront
Virtuous circle
Responsible consumption
Food sovereignty
Cultural action for the climate
Climate cooperation
Let's get organised

Line of action 15

Food sovereignty

Advocating local, ecological and healthy products that help to improve people's quality of life and preserve the environment.

JUSTIFICATION AND BENEFITS

The current agro-food model (industrialised agriculture, involving large amounts of resources and transport, diets that are not really sustainable, etc.) is responsible for a quarter to a third of global GHG emissions. Taking into account the total impact, it is calculated that, for every euro we spend as consumers on an agricultural product, the population as a whole pays two more linked to environmental damage and on people's health.

Switching to a food model with short circuits and local products, ecological and seasonal practices, and less animal protein, means taking the road towards food sovereignty, a territorial model involving more equality between the various agents, job creation, better health and a reduction in greenhouse gas emissions, because there is less need for transport, lower quantities of resources, and less dependence on external resources.

Foodstuffs are a vital product but Barcelona is a consumer, not a producer. Access to local or ecological products is still difficult in a dense urban environment such as Barcelona, but ecological consumption groups and cooperatives, the existing supply of local produce in municipal and farmers' markets, and the presence of shops selling ecological products, are improving access to those types of foods that are healthier and more sustainable, while providing an outlet for the agro-ecological producers near the city and, therefore, a local economy.

However, this market is still insufficient and only within the reach of part of the population. Promoting these kinds of products, practices, short circuits and entities should enable their use to become more widespread, flexible and accessible to everyone, because their benefits have to be capable of reaching as many people as possible and also because increased demand would allow supply to stabilise and diversify.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Barcelona Municipal Waste Prevention Plan (2012-2020).
- Barcelona Zero Waste Strategy (2016-2020).
- Strategy for Promoting Responsible Consumption (2016-2019) and subsequent updates.
- Plan for Promoting the Social and Solidarity Economy (2016-2019) and subsequent updates.
- Food Policy Promotion Strategy (2016-2019) and subsequent updates.

ILLUSTRATIVE ACTION

Access to a balanced Mediterranean diet in schools provides a great opportunity to promote healthier food habits.

All municipal nursery schools have their own kitchen where they prepare the menus every day. This facilitates the use of fresh, ecological produce.

In fact, the food served in school dining rooms comes from ecological agriculture. For example, all the dairy produce supplied (milk, yoghurt and cheese) are ecological, as is the most popular fruit (apples, pears, oranges and bananas) and the fruit juices, bread, rice, potatoes, pasta and pulses. The vegetables are ecological during the months when it is seasonally possible to get hold of them (e.g. lettuce, onions, carrots and pumpkins throughout the school year, and tomatoes, leeks, green beans and broccoli when they are in season).

As regards animal protein, the chicken is ecological throughout the year. The fish children get is hake, cod, monkfish and sole. At nursery school they do not eat pork or pork products, nor perch or halibut. And every meal is accompanied by salad.

This commitment to an ecological diet containing lots of raw food, vegetables and vegetable protein not only allows many children to have access to quality food on an equal basis, but also allows families to incorporate some of these habits into their daily diet, because they receive the school menu on a monthly basis.

Short-term actions (2018-2020)

15.1. **Promote an agro-ecological vision**, an approach with a triple focus (as a science, a social movement and a vision with agrarian practices), working with projects and communities and promoting links with all the agents involved (2018).

15.2. **Create and promote farmers' markets**, with producers from Barcelona's surroundings (2018).

15.3. De**velop short food circuits** with various initiatives and agents to boost local, ecological agriculture, and logistics to facilitate these circuits (2018).

15.4. **Create a pavilion for local ecological produce at Mercabarna**, in collaboration with other municipalities, the AMB, DIBA, the Generalitat, the Llobregat Agrarian Park, the Strategic Metropolitan Plan and producers' organisations (2019).

15.5. **Raise public awareness of the important contribution of food** (the food chain, distribution, eating habits and consumption patterns) **to climate change**. Make schools places for transmitting the values of a healthy and sustainable diet (2020).

15.6. **Promote the consumption of locally produced ecological products among the general public** by supporting the growth of ecological consumption groups, awareness campaigns, publishing guides, the More Sustainable Barcelona Map, etc. (2019).

15.7. **Consolidate the acquisition of locally produced ecological products and seasonal fruit and vegetables through communal dining rooms** (nurseries, schools, homes, etc.) and at various public events (meal services) through public procurement of food services (2019).

15.8. **Take the step to a healthier, low-carbon diet**, by increasing the production and consumption of local ecological products, promoting fresher diets rich in vegetable protein (therefore reducing the meat content) and less processed (pre-cooked) food (2020).

15.9. **Promote the use of local ecological food in the restaurant se**ctor (2020).

15.10. **Support the appearance of consumer cooperative initiatives** with higher scalability and other projects that boost the supply of responsible consumption products and services in the city (preferably ESS services) (2020).

15.11. **Combat food waste** by promoting integrated management of the food production cycle to prevent it from spoiling, establishing compulsory mechanisms and circuits for reusing surplus stocks, studying possible refuse tax exemptions, running communication campaigns targeting consumers, promoting the use of leftovers for new meals, etc. (2020).

15.12. Promote and boost training and activities designed to **introduce knowledge of vegetarianism** in various spheres (2020).

Medium- and long-term actions (2021-2030)

15.13. **Consolidate the green markets project and create new farmers' markets** evenly spread around the city (2025).

15.14. **Add the vegan/vegetarian option** to the Technical Instructions for the Application of Sustainability Criteria to Food Services (2025).

15.15. **Promote local commerce in the food sector** (2025).

15.16. **Promote the urban allotments network** for its social function and as an outreach tool, **and foster ecological peri-urban agriculture and livestock raising** in collaboration with supramunicipal authorities (2025).

15.17. **Promote food shops and spaces in the markets to show how to make the most of quality food with a short expiry date**, in order to foster saving and reduce food waste (2030).

MUNICIPAL PLAYERS INVOLVED

- Urban Ecology.
- Social Rights.
- Districts.
- Commissioner for Cooperative, Social and Solidarity Economy
- Enterprise, Culture and Innovation.
- Administration and Economy.

STRATEGIC LINES OF THE CLIMATE PLAN

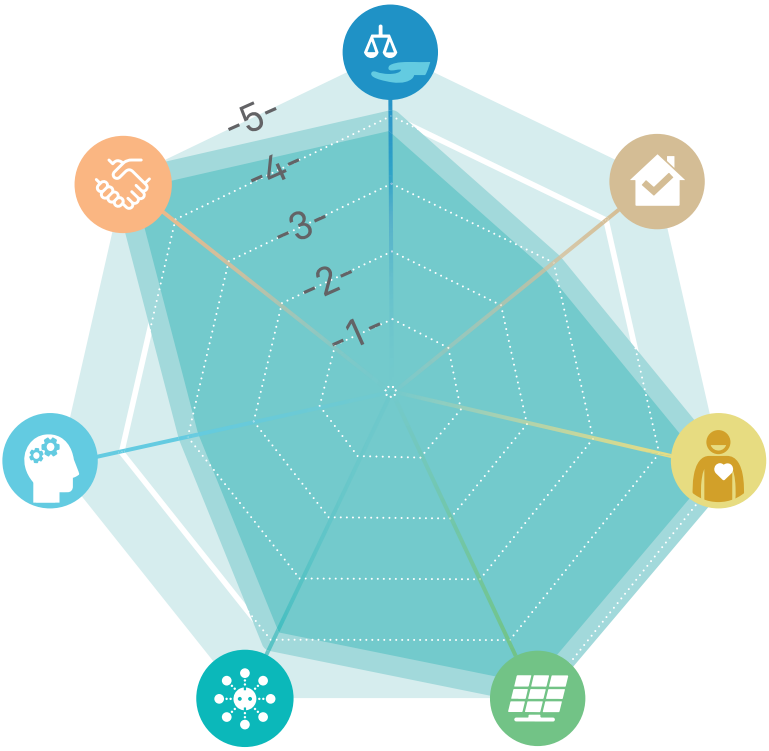
Mitigation **Adaptation** **Climate justice** **Promoting citizen action**

ASSOCIATED LINES OF ACTION:

Taking care of everyone · No cuts · Preventing excessive heat · Better than new buildings · Recovering terrace roofs · Planning with a climate focus · Many more green areas · Not a single drop wasted

VALUES OF THE CLIMATE PLAN

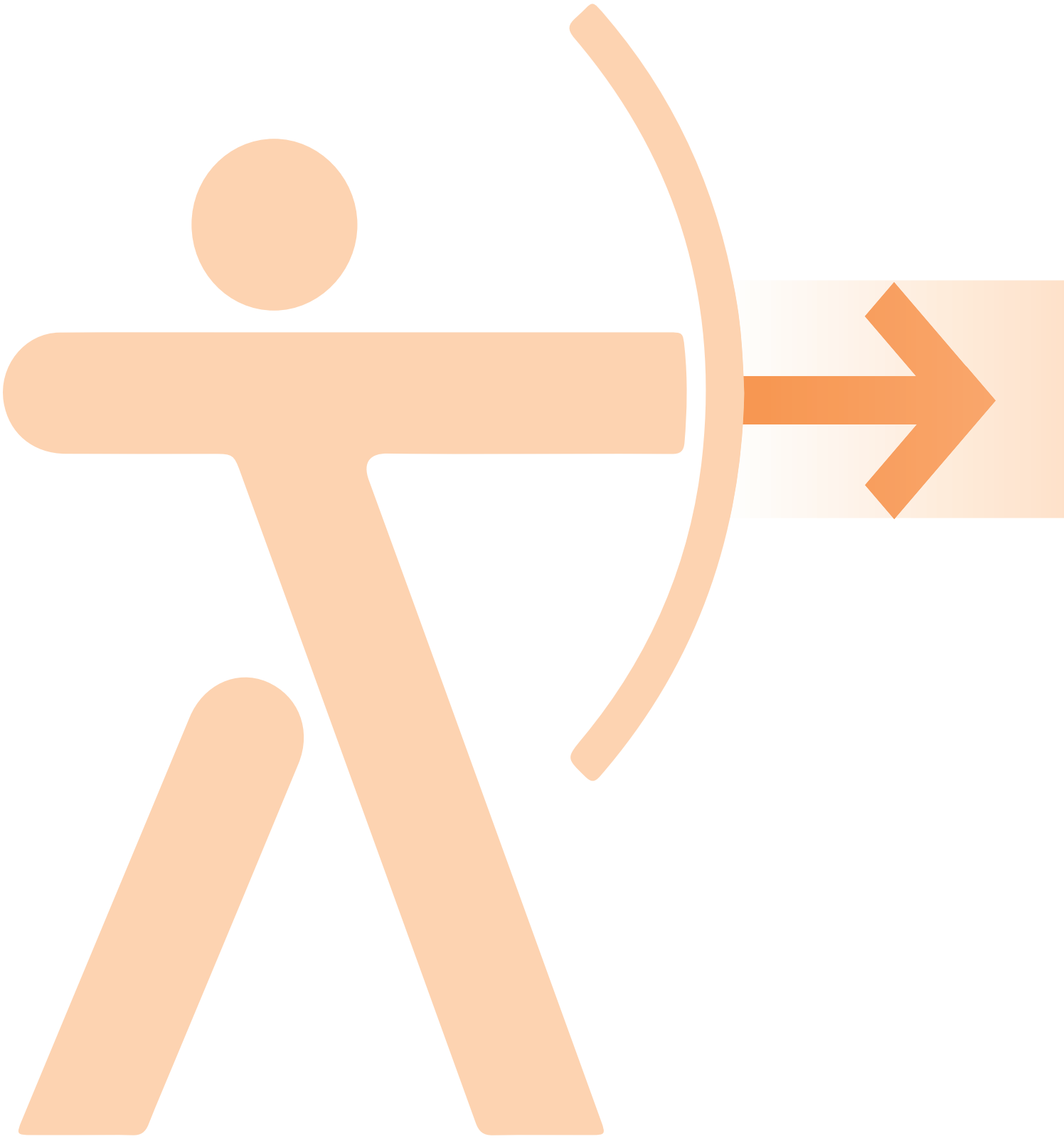
- SOCIALLY FAIR BCN
- HABITABLE BCN
- HEALTHY BCN
- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS



MONITORING INDICATORS

- Number of farmers' markets.
- Number of markets with local produce.
- Number of communal dining rooms with ecological products in season.
- City and metropolitan surface area (hectares) devoted to agriculture.

Renewables in public areas
Getting around easily
Conserving the seafront
Virtuous circle
Responsible consumption
Zero Waste
Cultural action for the climate
Climate cooperation
Let's get organised



Building together

Most of the population and, therefore, collective intelligence, is concentrated in cities. If everyone (citizens, businesses, institutions, the local authority, etc.) works together and there is cooperation between cities and regions, the change we need will come about.

Innovation is essential and we have to equip ourselves with the necessary knowledge, tools, structures and resources to tackle climate change. Education and communication are vital instruments for spreading knowledge and helping to raise everyone's awareness. Likewise, we need to facilitate and foster citizen debate and action.

16. Cultural action for the climate

17. Climate cooperation

18. Let's get organised

GOALS AND TARGETS FOR 2030

Allocate €1.2 million in subsidies for collaborative citizen projects (€200,000 every two years).

Have one cultural facility on sustainability per district

Line of action 16

Cultural action for the climate

Fostering climate culture and promoting public training in reducing emissions and adapting to climate change

JUSTIFICATION AND BENEFITS

Culture is a key element for overcoming any crisis, as the cultural context is the reference framework which shapes the way people live and act. We are faced with the challenge of transforming a culture based on increasing consumption of energy and resources, ignoring the undesirable effects this has on our habitat, into a culture that recognises planetary limits and fosters sustainable ways of living.

Therefore, we need to expand our knowledge and help raise awareness among individuals, organisations, institutions and businesses in Barcelona, so that everyone can assume their own responsibility and together we can shoulder the city's responsibility.

Education, communication and encouraging citizens to take action are vital instruments for advancing down this road, and must be firmly promoted by the City Council. The More Sustainable Barcelona network, made up by the signatories to the Citizen Commitment to Sustainability, is a key piece in this cultural transformation. New citizen projects developed under the Barcelona's Commitment to the Climate are a very good example of co-production. We also need to take advantage of the socialisation possibilities offered by ICTs for openly circulating knowledge, ideas and proposals among interconnected citizens.

On top of that, Barcelona has a very interesting community network at neighbourhood level, which could be very useful in dealing with climate change on a smaller scale. This is an opportunity for generating intersectoral (between various professional and interest spheres), interterritorial (between districts and neighbourhoods) and intergenerational dialogue (between the young and elderly population) to spread habits locally.

There are also facilities on a district level that could serve as active catalysts, such as the environmental classrooms (Bosc Turull, Sagrada Família, Centre Cívic Can Deu, Casa de l'Aigua) and the energy advice points. On a city level, there are two benchmark environmental facilities: the Fàbrica del Sol and the Centre de la Platja (Beach Centre).

PLAN ACTIONS

Actions already envisaged in the existing plans

- Creation of energy advice points and guaranteeing basic utility supplies (2016).

ILLUSTRATIVE ACTION

Specific call for subsidies for citizen climate projects

The City Council encourages citizen organisations to play a prominent and active role in the fight against climate change and promotes their initiatives.

The purpose of the subsidies is to provide financial support for projects that promote the reduction of greenhouse gas emissions, adapting the city to climate change and climate justice.

The call stresses that they should be cooperative projects involving at least three organisations, with one acting as leader, and that the subsidy may be up to 80% with a maximum of €20,000 per project.

The 2018 budget for these subsidies is €200,000.

Short-term actions (2018-2020)

16.1. **Establish a specific call for grants** to promote the citizen climate agenda, thus rewarding innovation and cooperation (2018).

16.2. **Reinforce the support programmes in schools, shops and local organisations** as spaces for climate awareness and action (2020).

16.3. **Highlight the commitments, actions and good practices of the various stakeholders** (2020).

16.4. **Put a sustainability reference figure in place in each district** with a strategic vision of environmental and climate change issues, with an overview of the participants in the district and the capacity to offer advice and support (2020).

16.5. **Strengthen the participation of the local community** in defining urban development, green development and mobility plans for mitigating the effects of climate change (throughout the whole process) (2020).

16.6. **Conduct campaigns on climate change** and its effects through the appropriate media, and **widely publicise options and habits that help to combat it**, countering all the myths (ongoing).

- Encourage efficiency and savings in energy and water consumption.
- Promote self-production and self-consumption using renewable energy.
- Raise awareness of the need for responsible consumption, of local and second-hand products.
- Promote sustainable mobility.
- Promote waste reduction and encourage composting.
- Promote an increase in green spaces and respect for wildlife that is threatened.
- Promote the care of vulnerable people (e.g. elderly people who live on their own).
- Enhance the shaded paths and promote their benefits.
- Encourage climate solidarity with other countries.

16.7. **Carry out actions that raise people's awareness and show what can be done locally**, such as ephemeral gardens, mobile exhibitions, vehicles that open out and turn into a green space or a mobile water point (a mobile green point that could have plants inside instead of waste, or a tourist bus with an "open" top full of plants), competitions, collaborative mappings, community allotments and tree wells, climate marathons, and so on (2020).

16.8. **Generate and make the most of public events** to give practical examples (annually).

- Exhibitions (such as "After the End of the World").
- Theme-based festivals (on art, photography, cinema and so on).

16.9. **Provide access to climate information** through Smart Citizens and other applications. Promote citizen science to obtain data on temperature, relative humidity, warnings, phenology, bird migrations and so on, and then share them. Carry out more publicity, adapt information

channels. Have climate information linked to people's everyday lives and activities (2020).

16.10. **Widely publicise information on the opportunities, subsidies and support available** (renovation, improved, energy efficiency improvements, training and so on) (ongoing).

16.11. **Provide support for the energy sovereignty network** (2020).

16.12. Establish the necessary mechanisms for **ensuring vulnerable people's participation in climate change** (2020).

Medium- and long-term actions (2021-2030)

16.13. **Consolidate a network of environmental education facilities in every district** in the city that act as vectors of information, training, participation, skills and citizen action, where climate change is an integral part of their discourse and which serve as examples for other centres in the city (2025).

16.14. **Promote the setting-up of citizen co-responsibility networks and climate action groups on a neighbourhood level** (2025).

16.15. **Have an energy-efficiency and climate-change interpretation centre** on a city level (2030).

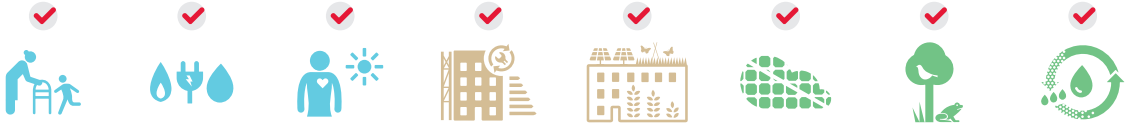
MUNICIPAL PLAYERS INVOLVED

- Urban Ecology.
- Districts.
- Barcelona Institute of Culture.
- Barcelona Education Consortium.
- Barcelona Municipal Institute of Education.

STRATEGIC LINES OF THE CLIMATE PLAN

Mitigation | Adaptation | Climate justice | Promoting citizen action

ASSOCIATED LINES OF ACTION:



Taking care of everyone | No cuts | Preventing excessive heat | Better than new buildings | Recovering terrace roofs | Planning with a climate focus | Many more green areas | Not a single drop wasted

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
- HABITABLE BCN
- HEALTHY BCN
- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS

MONITORING INDICATORS

- Number of organisations committed to citizen climate projects.
- Number of co-produced climate projects.
- Number of districts with sustainability benchmarks.
- Number of districts with environmental education facilities.
- Number of energy advice point consultations.

Renewables in public areas | Getting around easily | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | Climate cooperation | Let's get organised

Building together

Line of action 17

Climate cooperation

Making progress in reducing the city's ecological debt and raising public awareness of the effects of climate change stemming from Barcelona on more vulnerable countries and societies

JUSTIFICATION AND BENEFITS

In a mainly urban world, cities are the key to ensuring social equity, sustainable development and quality of life. However, the consumption habits of the inhabitants of the most prosperous cities such as Barcelona often generate a big ecological debt that falls on the most vulnerable societies, regions and countries. As a city in the Northern hemisphere, Barcelona must take the initiative and drastically reduce its emissions in order to improve social justice and not compromise the sustainability or everyday lives of the most vulnerable populations.

We need to make people more aware that our habits and the way we consume impact on everyday life and increase the risks for other parts of the world, as well as promote international cooperation projects aimed at reversing the ecological debt that the city has acquired.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Cooperation for Social Justice Master Plan (2018-2021).

ILLUSTRATIVE ACTION

Support for solid urban waste management in the outlying districts of Maputo (Mozambique)

Barcelona City Council's Department of Global Justice and International Cooperation funds projects to promote climate justice in Mediterranean, African and Latin American countries.

Maputo generates more than 1,100 tonnes of solid waste very day but almost 500 tonnes of that is not collected. In the city's outlying districts, which lack many basic services, solid urban waste management (GRSU) is now becoming a serious environmental, social and health problem.

Urban areas like the Maxaquene neighbourhood have grown out of the chaotic occupation of public spaces. That makes it enormously difficult to introduce, roll out and maintain basic services and the consequences of that are seriously affecting the daily lives of the people who live there.

The main purpose of the Maxaquene project is to improve GRSU in the neighbourhood by strengthening the network of primary collection associations with a social and solidarity focus, along with raising community awareness regarding the importance of recycling and the social, economic and environmental benefits of the work done by informal recyclers (catadors).

The activities have mainly been designed and implemented by two local organisations, Kutenga and Comsol, with the support of the Maxaquene neighbourhood development platform and in collaboration with the NGO Enginyeria Sense Fronteres (Engineering Without Borders).

Short-term actions (2018-2020)

17.1. **Learn more about the ecological/climate debt** and its effects on the most vulnerable countries and societies. Implement the principle of planetary limits in Barcelona's future strategic plans (2020).

17.2. **Generate more active social involvement in highlighting the effects of climate change on the most vulnerable countries and societies**, as well as conduct educational and awareness campaigns on Barcelona's ecological debt (ongoing).

Medium- and long-term actions (2021-2030)

17.3. **Define a comprehensive strategy for reducing Barcelona's ecological debt** that prioritises actions that have the biggest impact on third parties (2025).

17.4. **Foster climate solidarity between peoples** and develop projects that address the issue of correcting the effects of climate change on the most vulnerable countries and societies (2025).

17.5. **Promote cooperation between cities** on climate justice, urban resilience and energy policy matters, and start up technical support processes between Barcelona City Council and other cities that are highly vulnerable to climate change (2025).

17.6. **Prepare to take in climate refugees** (2030).

MUNICIPAL PLAYERS INVOLVED

- Mayor's Office.
- Administration and Economy.
- Districts.

STRATEGIC LINES OF THE CLIMATE PLAN

Mitigation

Adaptation

Climate justice

Promoting citizen action

ASSOCIATED LINES OF ACTION:

Taking care of everyone

No cuts

Preventing excessive heat

Better than new buildings

Recovering terrace roofs

Planning with a climate focus

Many more green areas

Not a single drop wasted

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
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- EFFICIENT, RENEWABLE BCN
- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS

MONITORING INDICATORS

- Number of international cooperation projects that have been carried out to correct climate change.
- Budget for international cooperation projects designed to improve climate justice.
- Number of users informed by awareness-raising campaigns.

Renewables in public areas | Getting around easily | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | Cultural action for the climate | Let's get organised

Line of action 18

Let's get organised

Incorporating changes on an organisational and working methodology level which will enable sustainability and resilience criteria to be integrated into city planning, transformation and management processes from an overall, systemic city perspective

JUSTIFICATION AND BENEFITS

Climate change is a global challenge that requires local actions. It is also a phenomenon that involves lots of environmental vectors (water, energy, biodiversity, waste, etc.). Consequently, it cannot be tackled in isolation by a specific local authority department. It requires a cross-departmental approach that takes the complexity of this phenomenon into account. That means involving the whole local authority, along with the other key players in the city.

Another major challenge is to incorporate the climate change variable into long-term city planning and management, not just because it implies setting goals and targets or acquiring commitments in the long term but also due to the uncertainty inherent in future projections and in managing climate impacts and the risks that flow from them. We will have to deepen our knowledge and improve the information available to us for making decisions, managing and putting climate action into practice.

This new working approach will also require tools that enable a more detailed analysis of the impacts and how these will affect people, generate internal training for the technical team involved and ensure accessibility to this new information.

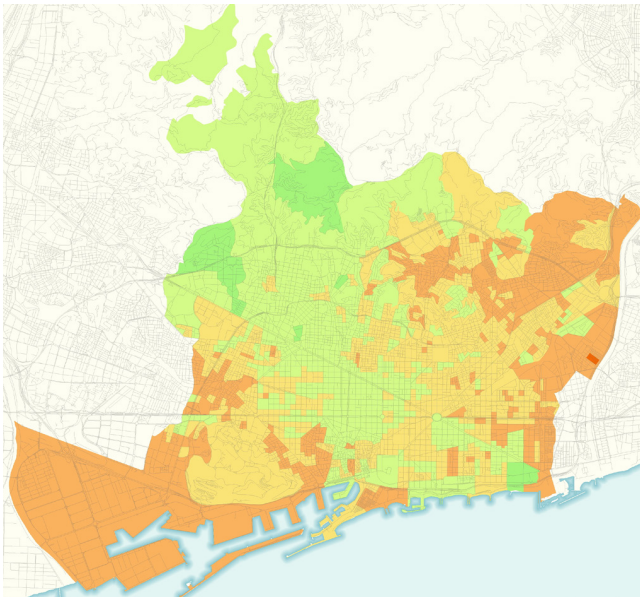
In turn, that will require changes on an organisational and working methodology level which will enable sustainability and resilience criteria to be integrated into city planning, transformation and management processes from a global, systemic city perspective.

PLAN ACTIONS

Actions already envisaged in the existing plans

- Urban resilience (2016).

ILLUSTRATIVE ACTION



The urban resilience information and analysis platform aims to provide a comprehensive overview of the city, by bringing together all the critical or relevant information gathered from the various systems involved.

Managing the city is a complex task due to the multiple operators involved and because, despite the obvious interdependencies between the different urban systems, they often manage their information separately.

This platform opens up a new possibility of managing and sharing information with all the agencies involved and enables the joint analysis of data which, up to now, was impossible to correlate, thereby providing new information to support decision-making processes both at a strategic and operational level.

Short-term actions (2018-2020)

18.1. **Set up a climate office** that will adopt a mainstream approach to working on climate change in the administration and a committee to monitor the implementation of the Climate Plan actions consisting of the core team driving the plan and other key players (2018).

18.2. **Define and calculate the monitoring indicators for the Climate Plan** and citizen coproduction products; draw up and publish periodic reports on compliance with the Covenant of Mayors for Climate and Energy (2018).

18.3. **Estimate the city's carbon budget** for meeting its acquired commitments (2018).

18.4. **Establish internal coordination mechanisms** for ensuring notification of progress made and monitoring the associated sectoral plans (2018).

18.5. **Establish the necessary external coordination mechanisms** and communication between the various administrations (especially Barcelona Provincial Council, the Metropolitan Area and the Catalan government), as well as with other key city players, in order to create synergies and help to achieve the Climate Plan's goals and targets, while boosting the role of the Citizen Council for Sustainability (2018).

18.6. **Incorporate a climate line of action for putting resilience board projects into practice** (2018).

18.7. **Make public, through Open Data, relevant information** on climate impacts and any monitoring action carried out (transparency) (2018).

18.8. **Take part in city networks** to foster the exchange of good practices and collaborate with benchmark international institutions, in order to position Barcelona as a model for climate action and report the results in line with acquired commitments (2018).

18.9. **Develop an internal training plan** with specific training for staff directly involved in climate action, as well as information and awareness-raising sessions on the importance of climate change (2020).

18.10. **Study each neighbourhood's contribution to generating greenhouse gases** to determine possible inequalities (2020).

18.11. **Deploy the municipal energy operator** which will drive renewable energy production in the city and facilitate its installation in public and private spaces (2020).

18.12. **Promote innovation and establish links with research centres to generate new knowledge on climate change**. Check what studies are currently under way to avoid overlapping and make the most of the funding available (2020).

18.13. **Learn more about the impact of climate change on keeping critical city services and infrastructures going** (health services, utility supplies, etc.) and how they depend on each other (2020).

18.14. **Learn more about how climate change will affect Barcelona** by taking part in the European RESCCUE project (2020).

18.15. **Do a study on the possible economic effect of climate change** on each sector, especially tourism (2020).

18.16. **Study the reduction in energy expenditure linked to adapting working hours** (2020).

18.17. **Include a common repository of climate information on the resilience platform** that ensures accessibility to all the players involved (2020).

18.18. **Create a resilience atlas** that includes vulnerability maps which ensure the information is accessible to all the municipal players involved in urban planning, development and services (2020).

18.19. **Map of all the climate initiatives put into practice** and publish them in the resilience atlas (2020).

18.20. **Revise municipal emergency plans** in the light of the new information generated on climate change (2020).

18.21. **Improve the communication systems with critical city facilities and services** during extreme climate episodes (2020).

Medium- and long-term actions (2021-2030)

18.22. **Systematise the use of climate information** between municipal technical staff, set up instruments that enable new information to be shared more effectively (resilience platform) and give staff the skills to use them, by means of the necessary training (extend the use of geographic information systems within the organisation to improve analysis capacity, etc.) (2025).

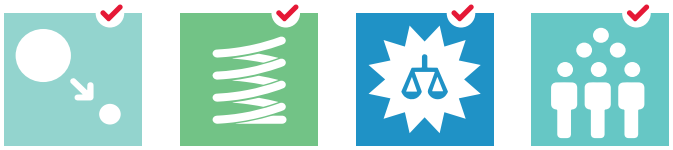
18.23. **Improve the public information provided in pollution episodes and warnings of new risks** (2025).

18.24. **Revise and update the Climate Plan** (2025).

MUNICIPAL PLAYERS INVOLVED

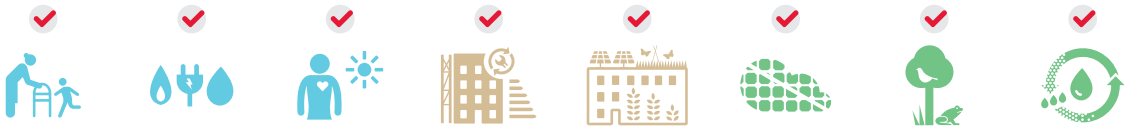
- Urban Ecology.
- Districts.
- Social Rights.
- Safety and Prevention.
- Resources.
- Barcelona Public Health Agency

STRATEGIC LINES OF THE CLIMATE PLAN



Mitigation | Adaptation | Climate justice | Promoting citizen action

ASSOCIATED LINES OF ACTION:



Taking care of everyone | No cuts | Preventing excessive heat | Better than new buildings | Recovering terrace roofs | Planning with a climate focus | Many more green areas | Not a single drop wasted

VALUES OF THE CLIMATE PLAN

- SOCIALLY FAIR BCN
- HABITABLE BCN
- HEALTHY BCN
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- LOW-CARBON, DISTRIBUTIVE BCN
- WHO LEARN
- COMMITTED BARCELONIANS

MONITORING INDICATORS

- Number of people trained on climate change.
- Amount of participation in research projects and improving our knowledge of climate change.
- Amount of content published on the resilience platform and other tools for access to information.

Renewables in public areas | Getting around easily | Conserving the seafront | Virtuous circle | Responsible consumption | Zero Waste | Food sovereignty | Cultural action for the climate | Climate cooperation

11. TIMEFRAME

Line of action 1. **Taking care of everyone**

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
1.1	Provide grants and subsidies for housing energy improvements.	●	●	●	●	●
1.2	Promote the figure of the energy adviser.			●		
1.3	Strengthen mobility services.			●		
1.4	Strengthen the City Help and Information Offices (OACs).			●		
1.5	Improve the social network of elderly people who live alone.			●		
1.6	Launch the "care-work school".			●		
1.7	Study the possibility of creating a carer card.			●		
1.8	Design pilot projects for social superblocks.			●		
1.9	Improve care services for people.				●	
1.10	Create an advice centre and information space on the care economy.				●	
1.11	Incorporate the climate variable in care work.				●	
1.12	Facilitate employment.				●	
1.13	Renovate housing.					●
1.14	Reduce the nuisance caused by bad smells.					●
1.15	Extend the introduction of social superblocks.					●

Line of action 2. **No cuts**

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
2.1	Ensure the public supply of potable water.	●				
2.2	Review the sewage tax.	●				
2.3	Ensure basic essential consumption of potable water, gas and electricity.	●				
2.4	Set up a municipal energy marketing company.	●				

2.5	Deploy the municipal energy operator.			●		
2.6	Improve our knowledge of the relationship between energy poverty and health.			●		
2.7	Reinforce the energy advice points (PAEs).			●		
2.8	Promote and prioritise self-produced energy using renewable sources.	●	●	●	●	●
2.9	Promote “energy banks”.				●	
2.10	Study the impact that climate change could have on the price of basic supplies and food.				●	
2.11	Guarantee energy and water supplies and uninterrupted service to critical facilities and infrastructures.					●

Line of action 3.
Preventing excessive heat

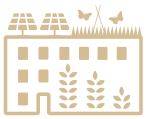
		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
3.1	Revise the Action Plan to Prevent the Effects of Heat Waves on Health.			●		
3.2	Identify existing and potential climate shelter spaces.			●		
3.3	Prioritise cooling actions in those territorial areas most vulnerable to heat.			●		
3.4	Deepen our knowledge of how climate change affects health.				●	
3.5	Deepen our knowledge of the urban climate.				●	
3.6	Create the “Barcelona, city of shade” programme.				●	
3.7	Create water gardens.					●
3.8	Improve the thermal comfort of climate shelter facilities.					●
3.9	Create new climate shelter spaces.					●
3.10	Increase health service staff to deal with heat waves.					●
3.11	Take action to increase the reflectance index of paving and terraces.					●

Line of action 4.
Better than new buildings

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
4.1	Set up a municipal energy marketing company.	●				
4.2	Promote actions and tools for energy improvements in Barcelona’s commercial sector.	●				
4.3	Undertake communication and publicity activities to encourage energy savings in buildings.	●				
4.4	Increase grants and subsidies for renovating buildings.	●	●	●	●	●
4.5	Provide tax incentives for incorporating energy efficiency measures.	●	●	●	●	●

Line of action 4.
Better than new buildings

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
4.6	Deploy the municipal energy operator.			●		
4.7	Study traditional energy solutions.			●		
4.8	Establish technical specifications for the new thermal comfort standards.			●		
4.9	Analyse how long it will take for new environmentally responsible systems to be able to compete with traditional systems.			●		
4.10	Monitor the energy performance of buildings, dwellings and public facilities	●	●	●	●	●
4.11	Study building systems and solutions to improve their protection against heat and passive cooling.				●	
4.12	Draft and enforce an energy by-law on building features.					●



Line of action 5.
Recovering terrace roofs

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
5.1	Draw up a by-law to promote productive roofs.	●				
5.2	Draw up technical guidelines for public buildings that include the use of productive roofs, walls and facades	●				
5.3	Set up a municipal energy marketing company at the service of everyone.	●				
5.4	Increase grants and subsidies for power generation and other types of productive roofs.	●	●	●	●	●
5.5	Provide tax relief for productive roofs.	●	●	●	●	●
5.6	Consolidate the green roof competition.	●	●	●	●	●
5.7	Promote initiatives that publicise and tell people about productive roofs.			●		
5.8	Offer technical advice on productive roofs and walls.				●	
5.9	Increase photovoltaic generation on industrial roofs.				●	
5.10	Promote rainwater collection and its reuse in buildings.					●

Line of action 6.
Planning with a climate focus

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
6.1	Adapt current urban development regulations.			●		
6.2	Draw up a design guide with sustainability and resilience criteria.			●		
6.3	Draft a green and biodiversity Charter.			●		
6.4	Analyse how climate change specifically affects each district.			●		
6.5	Locate and characterise the areas at risk.			●		
6.6	Influence higher-level planning instruments.				●	
6.7	Characterise the various urban fabrics according to the risks that affect them.				●	
6.8	Keep sufficient space in the soil and subsoil to allow for climate services.				●	
6.9	Rethink and adapt the criteria in the project and works protocols and in the technical specifications for urban space.				●	

Line of action 7.
Many more green areas

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
7.1	Incorporate climate change criteria in the Special Plan for protecting the environment and landscape of the Serra de Collserola nature reserve.			●		
7.2	Maintain the prevention and firefighting services.	●	●	●	●	●
7.3	Plan the network of urban green corridors with public participation.			●		
7.4	Prioritise the actions planned in the PIVU in those districts and neighbourhoods with fewer green spaces or infrastructure and those areas most exposed to heat.			●		
7.5	Consolidate existing programmes for conserving wildlife vulnerable to climate change.			●		
7.6	Step up comprehensive pest control.			●		
7.7	Consolidate the programmes to control arboviruses and other diseases.	●	●	●	●	●
7.8	Find solutions to the problem of mosquito reproduction in scuppers and reservoir roofs.			●		
7.9	Produce a catalogue of tree species.				●	
7.10	Decide which zones need more thermoregulatory vegetation, and those where it is not necessary, where xerophile vegetation may already be sufficient.				●	
7.11	Improve our knowledge of the effects of climate change on natural systems.				●	
7.12	Create ephemeral or seasonal gardens.				●	
7.13	Create a network of urban nature reserves.					●
7.14	Reclaim the Rec Comtal canal.					●

Line of action 8.
Not a single drop wasted

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
8.1	Foster water saving on a municipal level.	●	●	●	●	●
8.2	Incorporate up-to-date climate projections in future editions of the Drought Protocol.	●				
8.3	Increase soil permeability by defining a sustainable urban drainage strategy for Barcelona.		●			
8.4	Use drainage paving.			●		
8.5	Run publicity campaigns to foster water saving on a domestic level.	●	●	●	●	●
8.6	Envisage watering trees and increasing that whenever necessary for the desired evapotranspiration and cooling services.			●		
8.7	Ensure compliance with the protocol for emptying water into naturalised ponds.	●	●	●	●	●
8.8	Assess and continually monitor the quality of drinking water and groundwater.			●		
8.9	Have a Barcelona water supply plan in place.			●		
8.10	Draw up a base map of the subsoil.				●	
8.11	Promote the use of grey water.				●	
8.12	Study the energy impact of supplying water.				●	
8.13	Study the feasibility of producing regenerated water at the Besòs waste water treatment plant (EDAR).				●	
8.14	Exploit the Besòs aquifer resource.					●
8.15	Use regenerated water from the River Llobregat for industrial uses.					●
8.16	Build recharging pools.					●
8.17	Use pumped groundwater.					●
8.18	Prevent saline intrusion.					●

Line of action 9.
Renewables in public areas

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
9.1	Set up a municipal energy marketing company.	●				
9.2	Deploy the municipal energy operator.			●		
9.3	Facilitate the integration of power generation structures i nto public spaces.			●		
9.4	Create programmes to foster employment around local renewable power generation.	●	●	●	●	●
9.5	Evaluate incorporating generation in other parts of the public space.				●	

Line of action 10. **Getting around easily**

		Short-term actions			Medium- and long-term actions	
		2018	2019	2020	2025	2030
10.1	Improve public transport accessibility and frequency.	●	●	●	●	●
10.2	Promote cycling.	●	●	●	●	●
10.3	Improve modal interchanges between bikes and public transport.	●	●	●	●	●
10.4	Provide grants and subsidies for going to work by bike.	●	●	●	●	●
10.5	Electrify and diversify municipal vehicle fleets.	●	●	●	●	●
10.6	Promote plug-in electric or hybrid motorbikes.	●	●	●	●	●
10.7	Promote electric and mechanical bike fleets.	●	●	●	●	●
10.8	Strengthen and create new infrastructure linked with electric vehicle penetration.	●	●	●	●	●
10.9	Regulate parking and oversee the promotion of electric vehicles in the city.	●	●	●	●	●
10.10	Introduce and consolidate services associated with promoting electric vehicles.	●	●	●	●	●
10.11	Make the low emission zone permanent.	●	●	●	●	●
10.12	Improve goods distribution.	●	●	●	●	●
10.13	Consolidate the Poblenou superblock and create new ones.			●		
10.14	Implement the Barcelona City Council Mobility Plan.			●		
10.15	Urge companies to draw up sustainable mobility plans.				●	
10.16	Diversify fuels and electric vehicles in vehicle fleets.				●	
10.17	Promote a 100% low-emission taxi fleet.				●	
10.18	Link up the tram systems.				●	
10.19	Renew the bus and coach fleet with less polluting technologies.					●
10.20	Create park & ride zones in collaboration with other authorities.					●
10.21	Extend the superblock concept to the whole city.					●
10.22	Complete the roll-out of the orthogonal bus network.					●

Line of action 11.
Conserving the seafront

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
11.1	Analyse the social perception of the effects of climate change on the coast.	●				
11.2	Carry out further studies on the vulnerability of beaches to erosion and sea flooding.		●			
11.3	Define the strategy for protecting and the specific use of each beach.			●		
11.4	Establish sediment conservation measures.			●		
11.5	Redefine existing coastal uses .			●		
11.6	Naturalise the Barcelona coast.			●		
11.7	Promote sustainable use of the sea.			●		
11.8	Increase public knowledge of the sea.			●		
11.9	Apply adaptation and resilience increasing measures that are suited to the Barcelona coast.					●
11.10	Increase marine biodiversity.					●
11.11	Study the effects of climate change on sea temperature.					●
11.12	Reduce discharges into the receiving environment during periods of heavy rain and ensure that any water discharged into the natural environment is of sufficient quality.					●
11.13	Foster the protection and expansion of the current marine carbon sinks.					●
11.14	Re-plan the model for coastal area uses.					●

Line of action 12.
Virtuous circle

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
12.1	Draft a government measure on the green and circular economy.		●			
12.2	Foster low-carbon public procurement.			●		
12.3	Set up programmes for training and employment in the circular economy.			●		
12.4	Design a municipal strategy for the green and circular economy.				●	
12.5	Adapt Barcelona Activa to promote the green local economy.				●	
12.6	Set up programmes to foster green employment, self-employment and eco-entrepreneurship.				●	
12.7	Incorporate and promote ethical banking and entities involved in the cooperative, social and solidarity and economy (ECSS).				●	
12.8	Consolidate sustainable-bond issues.				●	
12.9	Develop a mechanism to compensate for emissions generated by major public works in the city.				●	
12.10	Study the options for improving environmental taxation.					●

12.11	Advise companies on reducing waste and emissions.					●
12.12	Facilitate the replacement of machinery and professional vehicles with others that are low in emissions.					●
12.13	Improve energy consumption efficiency in businesses, especially in shops and services.					●
12.14	Encourage companies and other entities to produce and consume their own energy from renewable sources.					●
12.15	Promote the consumption of waste-valorisation products and supplies.					●
12.16	Study the feasibility of having a green aaccounting system at City Hall.					●

Line of action 13. **Responsible consumption**

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
13.1	Create a new benchmark centre (Espai Consum) in the city that will promote responsible consumption.	●				
13.2	Set up the FAR (lighthouse) for social and economic innovation.	●				
13.3	Expand and strengthen the Network of Municipalities for the Social and Solidarity Economy.	●				
13.4	Continue the specific line of subsidies for responsible consumption.	●	●	●	●	●
13.5	Enrich the Municipal Consumer Information Office (OMIC) with a responsible consumption perspective .		●			
13.6	Highlight local authority strategies and good practices for responsible consumption.		●			
13.7	Conduct specific internal training on responsible consumption.			●		
13.8	Consolidate the Social and Solidarity Economy Fair and the Christmas Responsible Consumption Fair.	●	●	●	●	●
13.9	Apply and increase the use of social and environmental purchasing criteria in public procurement.	●	●	●	●	●
13.10	Foster economic initiatives based on responsible consumption.			●		
13.11	Raise public awareness of the responsibility of choice in consumption.				●	
13.12	Strengthen the greening of public-private events.					●

Line of action 14. **Zero waste**

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
14.1	Foster exchange and marketing of second-hand products.	●	●	●	●	●
14.2	Boost the setting-up of repair services.	●	●	●	●	●
14.3	Promote deposit, return and refund systems.	●	●	●	●	●
14.4	Introduce and promote the use of a reusable tableware loan service.	●				
14.5	Promote fab labs 2.0 (ateneus de fabricació).	●				
14.6	Promote waste reduction, management and reuse initiatives at events, trade fairs and conferences.			●		

Line of action 14. **Zero waste**

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
14.7	Optimise waste collection routes .			●		
14.8	Renew the cleaning and waste collection fleet with less polluting vehicles.				●	
14.9	Promote waste prevention in shops and department stores.				●	
14.10	Extend the door-to-door system where it is practical.					●
14.11	Foster and promote products and commercial formats that reduce or do away with packaging and the waste associated with it.					●

Line of action 15. **Food sovereignty**

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
15.1	Promote an agro-ecological vision.	●				
15.2	Create and promote farmers' markets.	●				
15.3	Develop short food circuits.	●				
15.4	Set up a local ecological pavilion at Mercabarna.		●			
15.5	Promote the consumption of locally-produced ecological food products among the general public.		●			
15.6	Consolidate dining-room purchasing of local ecological produce and fruit and vegetables in season.		●			
15.7	Raise public awareness of the important contribution food makes to climate change.			●		
15.8	Take the step towards a healthier, low-carbon diet.			●		
15.9	Promote the use of local ecological food in the restaurant trade.			●		
15.10	Support the appearance of consumer cooperative initiatives.			●		
15.11	Combat food waste.			●		
15.12	Introduce more people to vegetarianism.			●		
15.13	Consolidate the green markets project and create new farmers' markets.				●	
15.14	Add the vegan/vegetarian option to the food service guideline.				●	
15.15	Promote local commerce in the food sector.				●	
15.16	Promote the urban allotments network and foster ecological peri-urban agriculture and animal farming.				●	
15.17	Promote food shops and spaces in the markets to show how to make the most of quality food with a short expiry date.					●

Line of action 16.
Cultural action for the climate

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
16.1	Establish a specific call for subsidies.	●				
16.2	Reinforce the support programmes in schools, shops and local entities.			●		
16.3	Highlight the commitments, actions and good practices of the various stakeholders.			●		
16.4	Put a sustainability reference figure in place in each district.			●		
16.5	Strengthen the participation of the local community.			●		
16.6	Conduct campaigns on climate change and widely publicise options and habits that help to combat it.	●	●	●	●	●
16.7	Carry out awareness-raising actions that show what can be done locally.			●		
16.8	Generate and take advantage of public events.	●	●	●	●	●
16.9	Ensure access to climate information.			●		
16.10	Widely publicise information on the opportunities, subsidies and support available.	●	●	●	●	●
16.11	Provide support for the energy sovereignty network.			●		
16.12	Ensure vulnerable people's participation in climate change.			●		
16.13	Establish a network of environmental education centres in all the districts.				●	
16.14	Promote the setting-up of citizen co-responsibility networks and climate action groups at a neighbourhood level.				●	
16.15	Have an energy-efficiency and climate-change interpretation centre in place.					●

Line of action 17.
Climate cooperation

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
17.1	Deepen our knowledge of the ecological/climate debt.			●		
17.2	Generate more active social involvement in highlighting the effects of climate change on the most vulnerable countries and societies.	●	●	●	●	●
17.3	Define a comprehensive strategy for reducing Barcelona's ecological debt.				●	
17.4	Encourage climate solidarity between peoples.				●	
17.5	Promote cooperation between cities.				●	
17.6	Prepare to take in climate refugees.					●

Line of action 18.
Let's get organised

		Short-term actions		Medium- and long-term actions		
		2018	2019	2020	2025	2030
18.1	Set up a climate office.	●				
18.2	Define and calculate the Climate monitoring indicators.	●				
18.3	Estimate the carbon budget.	●				
18.4	Establish internal coordination mechanisms.	●				
18.5	Establish external coordination mechanisms.	●				
18.6	Incorporate a climate line of action for putting resilience board projects into practice.	●				
18.7	Make relevant information public through Open Data.	●				
18.8	Take part in city networks.	●				
18.9	Study each neighbourhood's contribution to generating greenhouse gases.			●		
18.10	Develop an internal training plan.			●		
18.11	Deploy the municipal energy operator.			●		
18.12	Promote innovation and establish links with research centres to generate new knowledge on climate change.			●		
18.13	Learn more about the impact of climate change on keeping critical city services and infrastructures going.			●		
18.14	Deepen our knowledge of how climate change will affect Barcelona.			●		
18.15	Do a study on the possible economic effect of climate change.			●		
18.16	Study the reduction in energy expenditure linked to adapting working hours.			●		
18.17	Include a common repository of climate information on the resilience platform.			●		
18.18	Create a resilience atlas.			●		
18.19	Map of all the climate initiatives put into practice.			●		
18.20	Revise the municipal emergency plans.			●		
18.21	Improve the communication systems with critical facilities and services.			●		
18.22	Systematise climate information use.				●	
18.23	Improve the public information provided in pollution episodes and warnings of new risks.				●	
18.24	Revise and update the Climate Plan.				●	

12. MONITORING

The Climate Plan proposes a large number of measures to achieve its strategic goals and targets. In order to assess whether the measures put into practice achieve the expected results, it also provides for a variety of indicators to monitor their development which adhere to some essential requirements: relevance, availability of easy-to-calculate data, sensitivity to changes, completeness, ease of interpretation and comparability. They include the following:

- **Impact indicators**, which measure the result achieved by the actions taken, the level of goal achievement (e.g. the reduction in GHG emissions).
- **Action indicators**, which measure the effort put in (e.g. the hours of training taught).
- **Resource indicators**, which measure the resources allocated to carrying out the various actions (e.g. renovation grants).
- **Environment indicators**, which measure the conditions of external elements that have a link with the plan's actions (e.g. the number of hot days).
- **Perception indicators**, which measure how the public have perceived (valued) the actions and their impact.
- **Performance indicators**, which show the percentage of plan performance as an average of the performance percentages of the actions planned. This enables a quantitative, objective evaluation of the state of the plan.

The purpose of these indicators is to accurately monitor the performance of the Climate Plan projects and the consequences they have in the city and on its big data, in order to provide an ongoing evaluation of the plan's real impact and overall reach.

The indicators will be calculated at the start of the plan, to provide some initial data, and then updated annually. A monitoring report will be published every two years to show the level of compliance with the Covenant of Mayors for Climate and Energy. Evaluation meetings will also be held with the public and other stakeholders involved to monitor the development of collaborative projects promoted by citizen action under the Barcelona's Commitment to the Climate.

This way it will be possible to control, show and communicate how the Climate Plan is being applied, to enable possible deviations to be corrected and redirect measures, where necessary. In that sense, this is a dynamic plan, because it will be periodically updated and programmed in line with these results

All the information will be public and posted on the Climate Plan website.

13. WOULD YOU LIKE MORE INFORMATION?

You will find all the information on climate change in Barcelona on the Climate Plan website:

- Video of the Climate Plan.
- Video of the coproduction process of the plan and Barcelona's Commitment to the Climate projects.
- Citizen action projects linked to the Barcelona's Commitment to the Climate and good practices.
- Analysis of the current situation regarding adaptation to climate change.
- Energy balance (2014) and sectoral studies.
- Studies on the impact of climate change on Barcelona (climate projections and the effects on heat, the availability of water, the risk of flooding, biodiversity, energy flows, air quality, etc.).
- Plan monitoring reports
- What can you do?
- Related news
- And plenty more!

Check it out at: http://lameva.barcelona.cat/barcelona-pel-clima/ca

13. BARCELONA, A TO THE CLIMATE

planning with a climate focus

Many more green areas

Not a single drop wasted

Renewables in public areas

Getting around easily

Conserving the seafront

Cultural action for the climate

Climate cooperation

Let's get organised

CITY COMMITTED

Taking care of everyone

No cuts

Preventing excessive heat

Better than new buildings

Recovering terrace roofs

Virtuous circle

Responsible consumption

Zero waste

Food sovereignty

14. INITIALS AND SYMBOLS

ASPB:	Barcelona Public Health Agency
BCASA:	Barcelona cicle de l'aigua, SA
CBC:	Barcelona's Commitment to the Climate
CO_2:	Carbon dioxide
COP21:	United Nations Framework Convention on Climate Change held in Paris in 2015
CSIC:	Advanced Scientific Research Centre
ECSS:	Cooperative, social and solidarity economy
EDAR:	Waste water treatment plant
ESS:	Social and solidarity economy
GHG:	Greenhouse gas
LPG :	Liquefied petroleum gas
GRSU:	Solid urban waste management
GWh:	Gigawatts per hour. A gigawatt is 1,000,000 kilowatts (KWh)
MVeh:	Millions of vehicles
NO_2:	Nitrogen dioxide
O_3:	Ozone
OAC:	Citizen Help and Information Office
OMIC:	Municipal Consumer Information Office
NGO:	Non-governmental organisation
PAE:	Energy advice point
PDA:	Tree Master Plan
PDUM:	Metropolitan Urban Development Master Plan
PE:	Energy poverty
PECQ:	Barcelona Energy, Climate Change and Air Quality Plan
PGIL:	Comprehensive Coastline Management Plan
GDP:	Gross Domestic Product
PIVU:	Programme for Promoting Urban Green Infrastructures
PLARHAB:	Barcelona Alternative Water Resources Plan
PM_{10}:	Particulate matter
POCS:	Action Plan to Prevent the Effects of Heat Waves on Human Health
RCP4.5 and 8.5:	Representative Concentration Pathway 4.5 (corresponds to the committed scenario) and 8.5 (corresponds to the passive scenario). These are emission scenarios for the estimated change in greenhouse gas emissions and concentrations during the 21st century set by the International Panel on Climate Change when drafting their fifth assessment report. The four RCP scenarios are: RCP2.6, RCP4.5, RCP6 and RCP8.5. These names are based on the possible range of radiative forcing values in 2100 (2.6; 4.5; 6.0 and 8.5 W/m^2, respectively).
RFD:	Disposable household income
SUDS:	Sustainable urban drainage systems
T10:	10-year return period
tCO2-e:	Tonnes of CO_2 equivalent

CLIMATE PLAN

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It has been co-produced by representatives of various bodies, associations, businesses, commercial establishments, schools and organisations, most of which belong to the Barcelona + Sustainable network, and with the involvement of the Citizen Sustainability Council, while members of the public have also contributed in an individual capacity through the Decidim platform or the sessions that have been held.

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